American Journal of Obstetrics and Gynecology

VOL. XXIII ST. LOUIS, JANUARY, 1932 No. 1

Original Communications

THERAPEUTIC ABORTION IN PULMONARY TUBERCULOSIS*

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THE patient with pulmonary tuberculosis is often referred to the obstetrician for the purpose of interrupting pregnancy. Too frequently the gynecologist or obstetrician lacks the special diagnostic skill required to arrive at the proper interpretation of chest diseases. If he is to be called upon to perform this operation, for which there is a very natural feeling of repulsion, he should acquaint himself with the experience and judgment of others. Unfortunately, in the literaature, of which there is a great abundance, there is a wide diversity of opinion. Certain individuals believe unconditionally that the uterus should be emptied; others, as of the French school, or because of religious belief, while they admit the unfavorable effect of pregnancy upon the pulmonary lesion, will not consent to abortion; between these two extremes are those who take under advisement the facts of each individual case and come to a conclusion as a result of their findings.

Based largely upon the increase of weight which accompanies pregnancy, early writings suggest that gestation may have a favorable influence on pulmonary tuberculosis. From the enforced rest necessitated by pregnancy, there may be an actual improvement. Any improvement which takes place, however, is likely to be only temporary. After the fifth or sixth month, rapid advancement of the disease usually occurs. One cannot fail in reading to be impressed by the unfavorable influence of gestation on pulmonary tuberculosis. Practically all agree that when the disease is active, pregnancy is an exceedingly serious complication. Reference to a few statistics will suffice to show the feeling of those who have studied this question. Bridgman and Norwood compared a series of 72 actively tuberculous nonpreg-

*Read before the Arkansas Valley Medical Society, Colorado Springs, January 10, 1931.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

nant patients with 20 which were actively tuberculous and pregnant. Of the former 35 per cent were living and had improved at the end of a year, while only 10 per cent of the pregnant women were well and had improved. Thirty-three per cent of the nonpregnant women were unimproved, and 40 per cent of the pregnant. Thirty-two per cent of the nonpregnant had died, as against 50 per cent of the actively tuberculous and pregnant patients.

A contrary opinion is expressed by Forssner of Stockholm, who believes that pregnancy exerts little if any influence on the course of tuberculosis. He compared a group of 341 tuberculous women who had been delivered, with 396 tuberculous patients who had not been pregnant. At the end of two years the mortality was essentially identical in the two groups, being very low when the tuberculosis was mild, higher when moderately advanced, and very high in the most severe type.

The Germans, owing to registration laws, have exceptional opportunities to gather figures which are of value. In this country it is generally believed that tuberculosis complicated by pregnancy usually undergoes exacerbation, and that in the interests of the mother, abortion should be induced if the disease is detected in the first five months of gestation. When recognized later, intervention is not indicated, as induction of premature labor is followed by results as serious as delivery at term. Von Bardeleben found that when cases were severe or acute all exhibited an aggravation of the disease, especially toward the close of pregnancy. Forty-seven per cent died during pregnancy, labor, or the puerperium. Parry in a series of 38 cases, all of the severe type, showed that 50 per cent died within two months following labor, and so one could continue with almost universal agreement as regards the effect of pregnancy in the active type of pulmonary lesion.

As regards the effect of pregnancy upon inactive pulmonary tuberculosis, there is not the same unanimity of opinion. Bridgman and Norwood in 10 patients whose histories and signs pointed to the diagnosis of pulmonary tuberculosis in an inactive stage at the time of delivery: none had died; one had had "flare-ups" one year and two years later; another four years after delivery; seven of the 10 were in excellent health from six months to five years following delivery. Recrudescence was not more frequent in this series than in patients not pregnant. These observers state that while no tuberculous patient is pronounced cured, obviously the longer the duration of the inactivity, the less likely is the possibility of recurrence.

Schauta, on the other hand, found that 68 per cent of patients who had been well for a considerable period prior to pregnancy, suffered a relapse. Numerous other German statistics are to the same effect.

The present report offers no opportunity for a discussion of the

value of abortion in inactive or quiescent lesions. Of five cases of this type for which I have performed this operation, there is no follow-up in three; one, with a minimal lesion arrested for two years preceding pregnancy, is well; the remaining is a recent case with a minimal lesion, quiescent but three months when pregnancy occurred, with not sufficient interval to report results.

All realize that the vital factors in the treatment of active pulmonary tuberculosis are rest, proper food, fresh air, freedom from worry, and the ability to cooperate. One class of patient may possess these resources sufficiently—to her, pregnancy will not be the serious factor it might prove to be in the less fortunate individual.

In the selection of cases in which pregnancy is to be terminated, each patient should be studied individually: the history, her physical condition, her resistance, and what the home life will be. We will be unable to judge properly in all instances. Though they are the rare exception, certain women with advanced pulmonary tuberculosis will go through pregnancy, labor, and the puerperium and remain as well as they were before. Because one cannot foretell the result, some authorities believe that, to be on the safe side, the uterus should be emptied in every instance, a radical opinion which would result in much useless sacrifice of the infant.

It has been my opinion that any patient with an active pulmonary tuberculosis, or one in whom the disease has been but recently arrested, will run a great risk if she becomes pregnant, and the combination of pregnancy, labor, and the puerperium may prove a lethal factor. If the disease has been without symptoms for two years, especially of the fibrotic type, even though advanced, she may quite safely accept the adventure.

There are opinions expressed and statistics compiled which go to show that the operation of therapeutic abortion offers no better results as regards the mother, than when pregnancy is allowed to continue.

Bridgman and Norwood consider that the results of the operation in active pulmonary tuberculosis do not justify its procedure. They make these deductions from 9 cases, all the patients having been operated upon between the second and third months, with the exception of one at the sixth month. Two or 22 per cent were living and improved at the end of one year, two were living but not improved, and five or 57 per cent were dead within a year. Such figures, they state, suggest that the prognosis is made worse by operation, and the child is sacrificed. They admit the small series from which conclusions are drawn but believe their figures will be substantiated. They state further, however, that it is conceivable that evacuation of the uterus may be done in the early months of gestation under a spinal anesthesia without shock to the patient, or with a degree of shock which is not unfavorable in its results; but with the technic in vogue today, the operation is followed by a higher mortality rate than if expectant therapy alone is employed.

Forssner believes that intervention is never indicated, and that when it is resorted to, it is productive of more harm than good.

Most observers are not in accord with the views expressed above. Norris, Sergent, Pankow, Bar, Kehrer, and many others advise the termination of pregnancy. This difference in opinions, and the statement by some that the operation is not justified, has led me to make a study of my own cases. I am presenting 38 instances of therapeutic abortion for which active pulmonary tuberculosis was the indication for operation. The complication of pregnancy and tuberculosis is encountered frequently in Colorado. These cases represent patients from the Colorado General Hospital, the Denver General Hospital, the Jewish Consumptive Relief Society, and private patients referred by reliable internists. The operations extend over a period of fifteen years. Of this number the "follow-up" is lacking in three cases, leaving 35 from which deductions are drawn. (Table I.)

There are seven deaths—20 per cent. An analysis of these shows that one with a minimal lesion died on the operating table from a nitrous oxide and ether anesthesia in the hands of an inexperienced anesthetist.

One died ten days following operation. Tuberculosis was far advanced with marked constitutional symptoms. The operation was a resection of the fundus, for combined interruption and sterilization, in a four months' pregnancy. A spontaneous pneumothorax developed and was the immediate cause of death.

The third death was two years subsequent to operation, a four months' pregnancy was complicated by a large ovarian cyst, the operation was hysterectomy and left salpingo-oophorectomy done under spinal anesthesia. The pulmonary lesion was advanced with marked symptoms. Improvement followed for six months, home conditions were poor, a laryngeal tuberculosis developed with progressive decline.

The fourth death resulted in a far advanced, very ill patient about six months pregnant. She had been spitting considerable blood. A bag was introduced and the products removed, using a small amount of nitrous oxide. A fatal hemorrhage occurred on the eighteenth postoperative day. This patient's pregnancy was complicated by a hydatidiform mole, about one-fourth of the placenta being involved.

The fifth I assume to be dead, she cannot be traced, a county patient with an advanced lesion and severe symptoms, three months pregnant, on whom an abdominal hysterectomy was done under a spinal anesthesia.

The sixth death occurred in a young woman, recently married. The lesion was moderately advanced, the symptoms severe. The uterus was emptied during the third month by dilatation and curettage under spinal anesthesia. A temporary improvement followed with then a rapid decline and death eleven and one-half months after operation.

Concerning the seventh death in a patient with a minimal lesion and slight symptoms, there is very little data. Her physician does not know how long after operation death occurred or anything of the circumstances. The operation was a curettage under chloroform at four and one-half weeks.

An analysis of these deaths shows that the first was unnecessary; of the remaining, four were in advanced cases, seriously ill, one in a moderately advanced case, seriously ill.

Most writers in presenting statistics on the subject of pulmonary tuberculosis and pregnancy, simply classify the cases as "active."

TABLE I. ACTIVE PULMONARY TUBERCULOSIS

	TYPE OF LESION	MONTH OF PREGNANCY	TYPE OF OPERATION	KIND OF ANESTHESIA	COMPLICATIONS AT TIME OF OPERATION	CONDITION AT PRESENT TIME	TIME SINCE OPERATION
1	Minimal lesion Symptoms moderate	6 wk.	D & C*	Ether	Small myoma	Unimproved	1½ yr.
2	Moderate lesion Symptoms moderate	2 mo.	Bag with manual removal	Chloroform	None	Improved	Last heard from 3 yr. after operation
3	Advanced lesion Symptoms moderate	8 wk.	Resection of fundus, sterilization	Spinal	None	Improved	2 yr.
4	Active record indefinite	7 wk.	D & C	Nitrous oxide	None	Unknown	10½ yr.
5	Minimal lesion Symptoms slight	2 mo.	D & C	Spinal	None	Improved	4 yr.
6	Minimal lesion Symptoms slight	4½ wk.	D & C	Chloroform	None	Dead	Time of death unknown
7	Moderate lesion Symptoms slight	6 wk.	D & C	Spinal	None	Improved	1½ yr.
8	Advanced lesion Symptoms severe Later laryngeal tuberculosis	4 mo.	Abdominal hysterectomy	Spinal	Large ovarian cyst	Dead	Lived 2 yr.
9	Advanced lesion Symptoms severe	3 mo.	Abdominal hysterectomy	Spinal	Patient very sick	Probably dead	Cannot be traced. Operation 3 yr. ago
10	Advanced lesion Symptoms severe	4 mo.	Resection of fundus, sterilization	Spinal	Patient very sick	Dead	10 days developed pneumothorax
11	Advanced lesion Symptoms moderate	3 mo.	Abdominal hysterectomy	Spinal	None	Unimproved	2 yr.
12	Moderate lesion Symptoms moderate	2 mo.	D & C	Chloroform	None	Unknown	15½ yr.
13	Minimal lesion Symptoms slight	8 to 10 wk.	Resection of fundus, sterilization	Spinal	None	Improved	2¼ yr.

*Dilatation and curettage.

TABLE I—CONT'D

	TYPE OF LESION	MONTH OF PREGNANCY	TYPE OF OPERATION	KIND OF ANESTHESIA	COMPLICATIONS AT TIME OF OPERATION	CONDITION AT PRESENT TIME	TIME SINCE OPERATION
14	Advanced lesion Symptoms severe, hemoptosis	6 mo.	Bag with manual removal	Nitrous oxide	¼ of placenta hydatidiform mole	Dead	18 days pulmonary hemorrhage
15	Advanced lesion Symptoms slight	8 wk.	D & C	Spinal	Artificial pneumothorax	Improved	2½ yr.
16	Minimal lesion Symptoms moderate	3 mo.	D & C	Ethylene	None	Improved	2 yr. 7 mo.
17	Advanced lesion Symptoms moderate	2½ mo.	Resection of fundus, sterilization	Spinal	None	Improved	7 mo.
18	Minimal lesion Symptoms moderate	6 wk.	D & C	Chloroform	None	Improved	3½ yr.
19	Advanced lesion Symptoms moderate	6 wk.	Resection of fundus, sterilization	Spinal	Artificial pneumothorax	Improved	1¼ yr.
20	Advanced lesion Symptoms moderate	6 to 8 wk.	D & C	Spinal	Artificial pneumothorax vomiting	Improved	1⅞ yr.
21	Moderate lesion Symptoms severe	3 mo.	D & C	Spinal	Nausea weakness	Dead	11½ mo.
22	Minimal lesion Symptoms slight	3 mo.	Vaginal hysterotomy	Nitrous oxide	None	Improved	Well 2 yr. Operation 7 yr. ago. No follow-up
23	Advanced lesion Symptoms slight	6 to 8 wk.	D & C	Spinal	None	Improved	1 yr. 9 mo.
24	Minimal lesion Symptoms moderate, hemoptosis	6 wk.	D & C	Nitrous oxide	None	Improved. 1 child since	8 yr. 5 mo.
25	Active record incomplete	6 to 8 wk.	D & C	Spinal	None	Improved	2 yr. 8 mo.
26	Minimal lesion Symptoms moderate	6 to 8 wk.	D & C	Ether	Large kidney stone	Improved	13½ yr.

TABLE I—CONT'D

	TYPE OF LESION	MONTH OF PREGNANCY	TYPE OF OPERATION	KIND OF ANESTHESIA	COMPLICATIONS AT TIME OF OPERATION	CONDITION AT PRESENT TIME	TIME SINCE OPERATION
27	Advanced lesion Symptoms moderate	7 to 8 wk.	D & C	Spinal	None	Unimproved	1 yr. 1 mo.
28	Moderate lesion Symptoms moderate	3½ to 4 mo.	Resection of fundus, sterilization	Spinal	None	Improved	2 yr.
29	Moderate lesion Symptoms moderate	2 mo.	D & C	Ether	None	Unknown	7 yr.
30	Moderate lesion Symptoms slight	3 mo.	D & C	Spinal	Retained portion passed 1 wk. after operation	Unimproved	Operation 2½ yr. ago. Improved up to phrenicotomy 1 yr. later
31	Advanced lesion Symptoms moderate	3 mo.	D & C	Ether	Laryngeal tuberculosis	Improved	Operation 14 yr. ago. Improved last report 3 yr. after operation
32	Moderate lesion Symptoms slight	6 wk.	D & C	Nitrous oxide	None	Improved	5 yr. 3 mo.
33	Advanced lesion Symptoms moderate	3 mo.	Bag and manual removal	Chloroform	None	Improved. 1 child since	15½ yr. Advanced fibrous lesion
34	Minimal lesion Symptoms slight	6 wk.	D & C	Nitrous oxide	None	Improved. 2 children since	5½ yr.
35	Moderate lesion Symptoms moderate	7 wk.	D & C	Spinal	None	Unimproved	2 yr. 10 mo.
36	Advanced lesion Symptoms moderate	3 mo.	Vaginal hysterotomy	Nitrous oxide	None	Unimproved	2 yr. 1 mo.
37	Advanced lesion Symptoms moderate	2 mo.	D & C	Nitrous oxide	None	Improved fibrous lesion. One child since	1 yr. 10 mo.
38	Minimal lesion Symptoms slight	3½ mo.	Abdominal hysterectomy	Nitrous oxide and ether	Anesthetic death	Dead	Death on operating table

The subsequent progress of the disease and the effect of interruption of pregnancy, depends very largely on the type of lesion and degree of symptoms at the time of interference. This is to me the most vital consideration. Table II is arranged to indicate results according to the amount of involvement and degree of symptoms. The classification of the National Tuberculosis Association has been followed.

Table II shows, as would be expected, that those presenting a minimal lesion do better: 72.7 per cent have improved, 9 per cent are unimproved. The two deaths, 18 per cent, are represented by the anesthetic death previously mentioned, and by the one of which nothing but the fact of death is known.

There are nine cases with a moderate lesion. The result in two is unknown. Four or 57.2 per cent are improved. Two or 28.56 per cent are unimproved. There is one death, 14.3 per cent.

TABLE II

LESION	SYMPTOMS	IMPROVED	UNIMPROVED	DEAD	UNKNOWN
Minimal 11 cases	Slight Moderate Severe	4 = 36.3% 4 = 36.3%	1 = 0.9%	2 = 18%	
	Total	72.7%	0.9%	18%	
Moderate 7 cases	Slight Moderate Severe	2 = 28.6% 2 = 28.6%	1 = 14.3% 1 = 14.3%	 1 = 14.3%	2
	Total	57.2%	28.56%	14.3%	
Advanced 16 cases	Slight Moderate Severe	2 = 12.5% 7 = 43.7%	3 = 18.7%	 4 = 25%	
	Total	56.3%	18.7%	25%	
Lesion active Type unknown	Degree of symptoms not definite	1			1

In the advanced cases, of which there are 16, 56.3 per cent have improved, 18.7 per cent are unimproved, and four or 25 per cent are dead. These deaths are in cases showing severe symptoms at the time of operation.

It is my contention, as I believe is shown in this series, that the seriously ill patient is rarely benefited by interruption of pregnancy. Death occurred in all four of such of my cases in the advanced group, and in the one moderately advanced, seriously ill. The gynecologist when presented with these patients finds himself placed in a very difficult position; the mother is doomed whatever the surgeon decides to do, yet the family and often the physician will urge interference. My belief is that when the individual is desperately ill, pregnancy should be allowed to continue, resorting to cesarean section at, or as near term as possible, in the hope that occasionally a child may be saved.

Table III is arranged to show the results from the type of operation performed.

There are 23 cases on which a curettement was done, about the simplest procedure possible. The results are unknown in three. Fourteen or 70 per cent are improved, four or 20 per cent unimproved, with two deaths, 10 per cent.

The use of the dilating bag with removal of the products of conception manually, also a simple procedure, is represented by only three cases; it shows the next best results, with two or 66.6 per cent improved and one dead, 33.3 per cent.

Vaginal hysterotomy, splitting the cervix with removal of the fetus and placenta, shows one case improved and one unimproved.

There are four cases of abdominal hysterectomy: one case unimproved, 25 per cent; and 3 dead, 75 per cent. These deaths are in far advanced lesions and the anesthetic death, and were in patients four

TABLE III. TYPE OF OPERATION

		IMPROVED	UNIMPROVED	DEAD	UNKNOWN
Simple procedure	Curettement	14 = 70%	4 = 20%	2 = 10%	3
	Bag with manual removal	2 = 66.6%		1 = 33.3%	
	Vaginal hysterotomy	1 = 50%	1 = 50%		
	Total	70.8%	20.8%	8.3%	
More radical	Abdominal hysterectomy		1 = 25%	3 = 75%	
	Resection of fundus with fetal sac. Combined sterilization	5 = 83.3%		1 = 16.6%	
	Total	50%	10%	40%	

months, three months, and three and one-half months respectively. There is no question that the larger operations with shock, loss of blood, and stormy convalescence are to be avoided when possible.

Regarding the cases in which resection of the fundus was done for the purpose of combining therapeutic abortion with sterilization, there are six cases: five improved, 83.3 per cent; and one death, 16.6 per cent. The death occurred in the patient previously described with a far advanced tuberculosis, seriously ill, who developed a spontaneous pneumothorax and was four months pregnant.

Regarding this operation, in certain instances sterilization of the tuberculous patient is indicated. Osler quotes Dubois to the effect that "If a woman threatened with tuberculosis marries, she may bear the first accouchement well, the second with difficulty, and the third never." It is obviously wrong to allow repeated pregnancies where there is recurring recrudescence of an old lesion. An operation which I have devised is done by laparotomy under spinal anesthesia. A wedge of the fundus, including the cornual ends of the tubes, the

products of conception, and the compact portion of the decidua, is removed without opening the sac. Stay sutures placed, including the uterine ends of the tubes and a part of the body of the uterus, largely check the bleeding, the small amount from the cut surface of the uterus is controlled by Allis forceps. The elliptical incision is then closed in three layers, and the raw surface covered by the round ligaments, which also serve to hold the uterus in good position. The operation is quickly performed, simple even in the more advanced cases of pregnancy, clean, and eminently satisfactory. Often a far advanced pregnancy is more easily and safely cared for by this operation than by attempting removal from below. It has this advantage over the usual hysterotomy and some combined operation on the tubes, in that the one incision in the uterus does for both these procedures. Ovarian function and menstruation are normal.

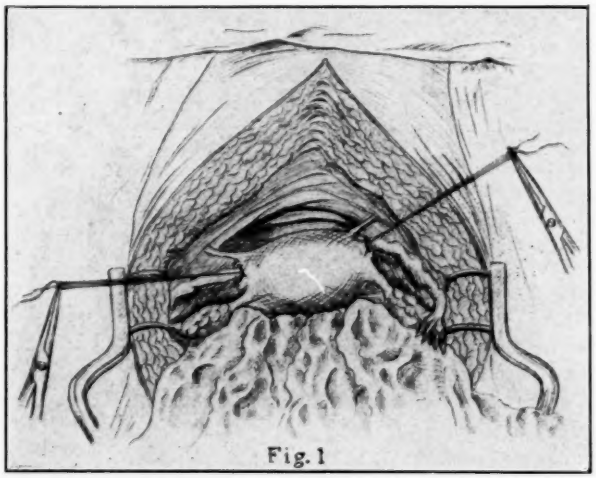

Fig. 1

Table IV refers to the period of gestation at the time of operation. The cases are arranged to include those operated upon before and including the third month, and those done at a later date. The earlier the pregnancy, the simpler the procedure. Interruption performed after the third month offers technical difficulties which may influence the future progress of the patient.

Twenty-one or 70 per cent operated upon during the first three months are improved. Six or 20 per cent are unimproved. Three or 10 per cent are dead. The results in three are unknown.

TABLE IV

	IMPROVED	UN-IMPROVED	DEAD	UNKNOWN
3 months or less	21 = 70%	6 = 20%	3 = 10%	3
More than 3 months	1 = 20%		4 = 80%	

There are five cases operated upon after the third month: one improved, 20 per cent; with four dead, 80 per cent. An analysis of the deaths in this latter group shows one due to the anesthetic; the other three are in advanced tuberculosis in seriously ill patients, one at six months, the two others at four months.

The condition of the patients at the time of operation has undoubtedly been a greater factor than the duration of pregnancy. One must,

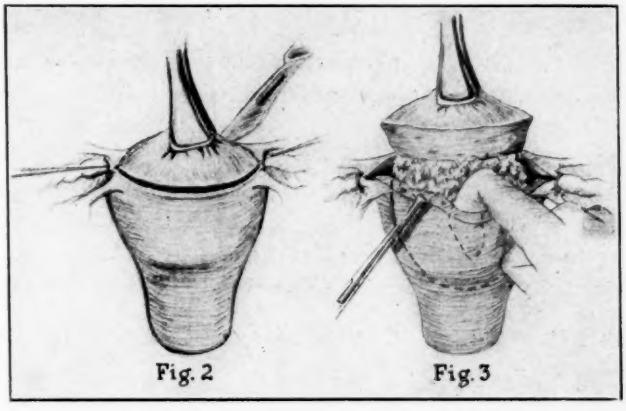

Fig. 2 Fig. 3

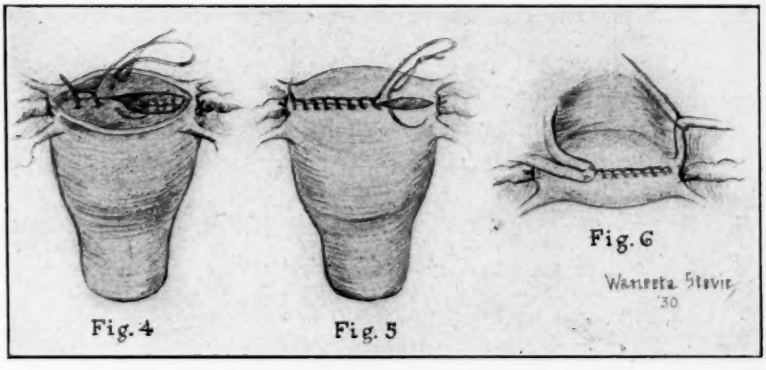

Fig. 4 Fig. 5 Fig. 6

however, consider the shock, possible loss of blood, and effect on the lesion from the operation in the more advanced cases of pregnancy. It may be preferable to allow a continuance to term, without sacrifice of the child, by delivery in the manner best indicated. Most observers believe that interruption at a later date than five months offers as serious difficulties as labor at term.

The final consideration concerns the kind of anesthesia. In nine nitrous oxide, five chloroform, four ether, and in one ethylene was used, in 19 spinal anesthesia was employed. While undoubtedly one type of inhalation anesthetic possesses qualities superior to another

as regards lung irritation, kidney damage, and postoperative sequelae, they will be grouped together for comparison with spinal anesthesia.

From Table V there seems to be little choice: 68.7 per cent improved, 12.5 per cent unimproved, and three dead, 18.7 per cent, with inhalation anesthetic, as against 57.9 per cent improved, four or 21 per cent unimproved, and four or 21 per cent dead with spinal. The inhalation figures are a little better. Concerning the deaths, one was definitely due to anesthetic. The three deaths in the spinal cases were all far advanced pulmonary cases, one moderately advanced, seriously ill.

In spite of the findings, my impression is that on operating upon women with pulmonary tuberculosis, spinal anesthesia is preferable. There is little or no lung congestion. Shock, nausea, vomiting, straining, and abdominal distention are lessened. In abdominal work relaxation is complete, and when the cervix is dilated it stretches more easily.

If we are to sacrifice the fetus for the welfare of the mother, let us stop to consider what the outlook for the child born from the tuber-

TABLE V. TYPE OF ANESTHETIC

	LESION	IMPROVED	UN-IMPROVED	DEAD	UNKNOWN
Inhalation	Active	11 or 68.7%	2 or 12.5%	3 = 18.7%	3
Spinal	Active	11 or 57.9%	4 or 21.0%	4 = 21.0%	0

culous mother would be. Congenital tuberculosis is practically a negligible consideration. Whitman and Greene have collected 38 cases with characteristic histologic findings, and 21 others in which bacilli could be demonstrated in the fetus and placenta, but without tissue lesions. As regards the susceptibility of the child to this disease, it is still an unsettled point. The child of the tuberculous mother, provided it is in intimate contact, has a poor chance of escaping infection. About 50 per cent (Parry) die within the first year, with a high rate of mortality in the next two to three years. When the child is taken away from the mother and put in suitable surroundings, it has an excellent chance. Armand Delille studied a series of 787 children born or living in 175 families, one or more members of which were tuberculous; of these 323 were placed in the country and did well, 396 were not removed, and of these 238 developed tuberculosis.

A certain percentage of deaths in children of tuberculous mothers is due to improper bottle feeding and inadequate care on account of the invalidism of the mother. Norris says that while we see large healthy babies from tuberculous mothers, it is probable that a large series of cases would show that they averaged smaller and weaker than from the healthy mother.

A summary of these 35 cases for which therapeutic abortion was done because of active pulmonary tuberculosis, shows 22 or 62.9 per cent improved, 6 or 17.42 per cent unimproved, and 7 or 20 per cent dead.

The fact that these figures are better than those of certain other observers might indicate that the operation was done in the presence of minimal or moderate lesions. In all the disease was active at the time of operation. Eleven showed a minimal lesion, seven moderately advanced, and 16 an advanced disease. In five the symptoms were severe at the time of operation, and all have died. In the far advanced, severe case the immediate and later mortality is so high as to render little value from the operation. The effect of pregnancy on the actively tuberculous patient is so universally bad, that if she is to be spared a life of invalidism and be given a chance for recovery, gestation should be interrupted when the opportunity for improvement is possible. The type of operation, the period of gestation, and the anesthetic to be used are other factors of importance.

If the expectancy of death is in the neighborhood of 50 per cent when pregnancy is allowed to continue in the presence of active tuberculosis, this review would indicate that the operation of therapeutic abortion is justified.

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THE THERAPEUTIC AND DIAGNOSTIC VALUE OF CURETTAGE IN SO-CALLED FUNCTIONAL UTERINE BLEEDING

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IT IS almost axiomatic, that a woman with abnormal uterine bleeding at some time or other in the course of the disease, is subjected to a curettage. What is the purpose of this procedure, and what value has it? Too often it is done because the patient seems to expect it, or because the physician has ingrained in his gynecologic training the association of curettage with uterine bleeding. That it is important and often necessary is unquestioned. Its value as a diagnostic measure is a well-established fact. The necessity for its use in all cases before the introduction of radium, or the utilization of x-ray therapy is too well accepted to admit of discussion, but does it in addition hold out a hope of cure, and if so, in what type of case? The two points we wish to emphasize are, its curative value, if any; and its importance as a procedure to obtain material as a basis for prognosis in functional uterine hemorrhage.

Novak and Martzloff[1] state that a small group of bleeding cases was cured by means of curettage. Novak, in his monograph[2] mentions the fact that cases of uterine hyperplasia and associated bleeding were not usually cured by curettage. Hintze,[3] in a review of uterine bleeding and curettage had 24 cases of a benign type, 20 of a serious type and 4 atypical cases. The histologic pictures of the curettings obtained from these cases gave no indication of their clinical variation. In his follow-up, which lasted from four months to three years, he had 6 cures in the mild cases following the first curettage; and 6 cures following the second curettage from one and a half to two years after the primary one. The histologic pictures of the mucosa obtained at the second curettage were the same as the first. In the severe cases hysterectomy or radiation alone gave good results.

Fuss,[4] in the study of the effect of curettage on bleeding, divided his cases into mild, medium, and severe hyperplasia. In 17 cases of the mild type, 13 patients were cured. In 14 cases of the moderate grade, 2 patients were cured, and of the 19 cases of the severe grade, none were cured. By cure, he meant a cessation of the bleeding, or a return to normal. He likewise had a group of cases in which he found atrophic mucosa. These were elderly women, and 5 of the 6 cases were cured by curettage, there being no periods after the operative intervention. There were 15 cases of endometritis with 13 cures, and he concludes that inflammations and polyps, or the bleeding associated with atrophy in old women can be helped, while that associated with hyperplasia is not cured by curettage.

Schickele and Keller[5] in 111 patients curetted for uterine bleeding had 38 successful and 61 unsuccessful cases. Of the 38 successful cases only 4, or 10 per cent were associated with hyperplasia; and of the 61 unsuccessful cases 9, or 15 per cent were associated with hyperplasia.

Shaw[6] published a classification of bleeding cases. In 53 patients between the ages of forty and fifty, the endometrium showed superficial areas of necrosis with no premenstrual change. They gave a history of bleeding usually from eight to ten weeks. In 50 per cent of the cases there was a period of antecedent amenorrhea. Thirteen per cent of these cases were permanently cured by curettage.

Novak and Martzloff[7] advise curettage in hyperplasia associated with bleeding, as at times a cure results. Most often, however, bleeding recurs in a few weeks or months. It may be preferable, in young women, to repeat the curettage several times.

Graves, Anspach, Eden and Lockyer all mention the use of the curette as a means of alleviating the bleeding associated with hyperplasia, but none of them believe it is curative.

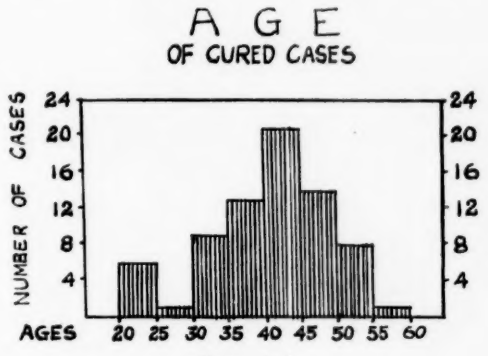

Chart 1-*A*.

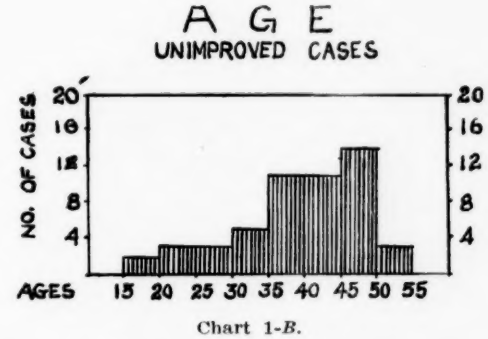

Chart 1-*B*.

We can see from the expressed opinions, that while curetting is advocated as the only nonradical operative therapeutic measure, nevertheless, its value as a means of permanent cure is apparently not very great.

Our study included 142 cases. We attempted to determine if curettage alone was a curative measure and to what extent it could be relied upon. Furthermore, we endeavored to define a pattern from the histologic study of the mucosal shreds which would permit us to prognosticate in what type of cases we might expect a satisfactory, permanent result from curetting, and in what type other procedures were advisable. Seventy-three cases were classified as cured by curet-

ting, 69 as improved or unimproved. The follow-up in these cases was over a period of six months to two years. It is, of course, inconclusive in so far as the period of observation was limited.

In Chart 1 A, which illustrates the variation in age of those cases which were cured, it will be noted that the greatest number of cures was obtained between the ages of forty and forty-five. On the other hand, the comparison with Chart 1 B, representing the uncured cases, the proportion of failures was greatest between the ages of forty-five and fifty. On the whole, there is too little difference in the two groups to enable us to utilize the age of the patient as of prognostic importance.

CHART 2

	MARRIED	WIDOW OR DIVORCED	SINGLE	TOTAL
Cured	68	3	2	73
Unimproved	41	4	7	52
Improved	12	5		17
Total	121	12	9	142

In Chart 2, representing the marital status, it can be seen that no definite decision can be made from the marital status that would be of prognostic significance.

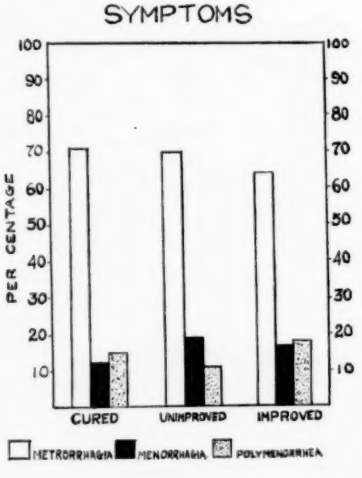

Chart 3.

Chart 3, which illustrates the variation in symptoms, shows that the proportion of cured cases was strikingly similar to those that were unimproved, or slightly improved, irrespective of whether the complaint was metrorrhagia, menorrhagia, or polymenorrhea.

In Chart 4 it was noted that the proportion of cured cases was greatest in the menorrhagias of comparatively recent date, that is, a history of from three to five weeks. On the other hand, the proportion of un-

cured cases, see Chart 5, was strikingly similar, being most marked in the metrorrhagias of from two to three weeks to two to three months. The result of this similarity leaves any deduction from the duration of the symptoms indecisive.

The histologic study of the curetted material gave us a little more satisfactory data on which to base a prognosis. As will be seen from Chart 6, in those cases where the glands were not increased in numbers, cures were more frequently obtained. (Fig. 1.) In those cases

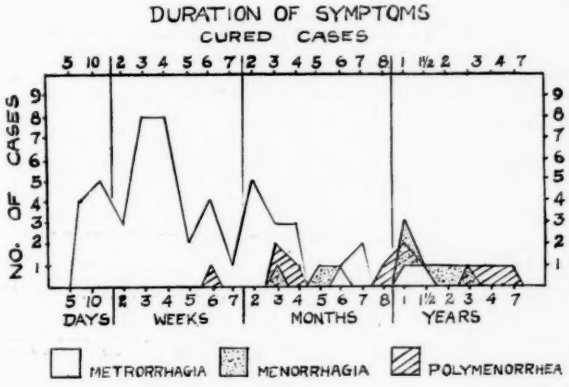

Chart 4.

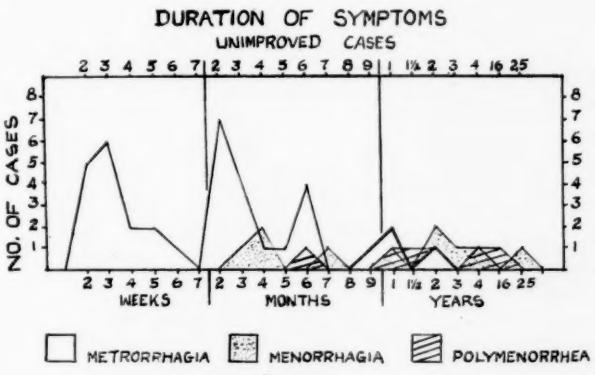

Chart 5.

in which the disturbance of the glands was irregular, and by that is meant an increased number of glands, cystic or otherwise, in both superficial and basal layers with no definite arrangement, the cures were definitely less frequent (Fig. 2) than where the disturbance of the increased or dilated glands was limited to the basal layer. In addition, those cases which presented, as seen in Chart 7, cystic glands in large numbers, were the least amenable to treatment by curetting. (Figs. 3 and 3-A.) The character of the stroma, which was also studied, and the result of which is graphically presented in Chart 8.

did not seem to enable us to prognosticate the therapeutic result from curettage. Those cases showing either cellular or edematous stroma occurred in greatest numbers and showed, approximately, an equal

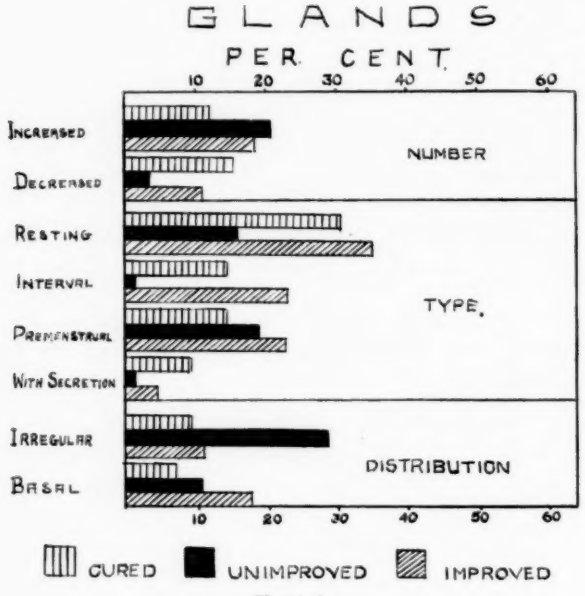

Chart 6.

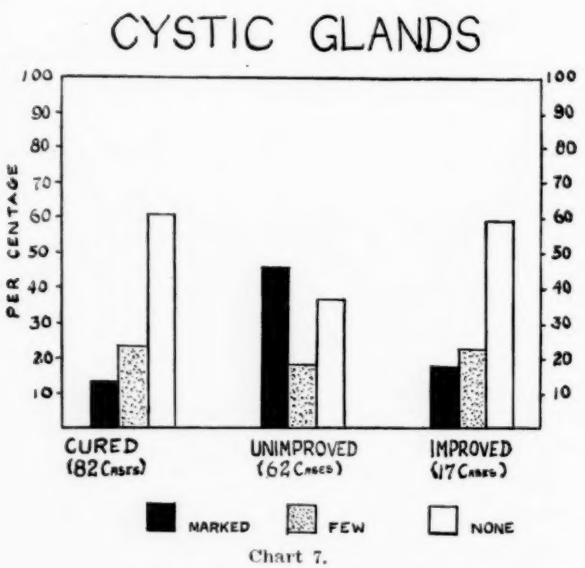

Chart 7.

number of cases cured, improved, and unimproved. The surface of the mucosa was also studied, as represented in Chart 9, and it will be noted that in those instances where the surface was reported as

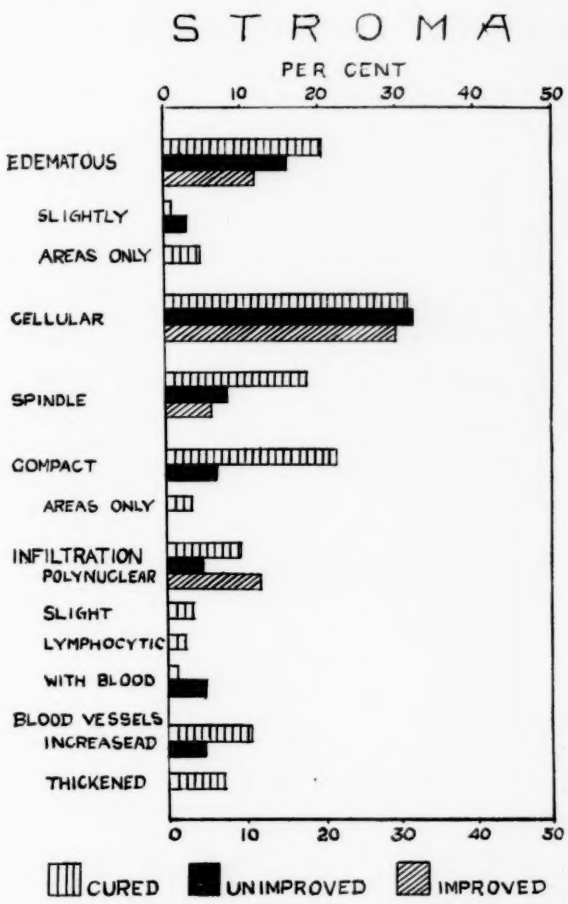

Chart 8.

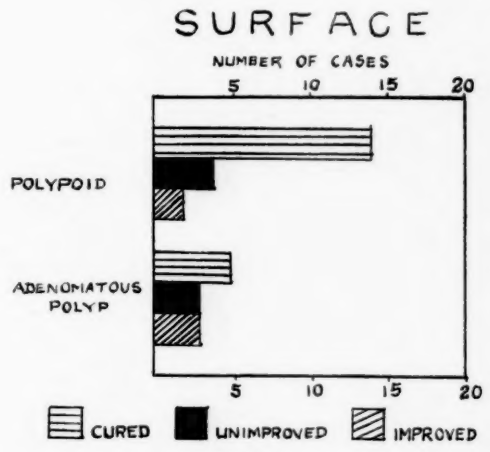

Chart 9.

polypoid, the proportion of cures was greatest. (Fig. 4.) Of course, it was also found that the polypoid surface was more commonly associated with a mucosa that did not present a tremendous increase in glands, or irregularity in distribution. Of the 9 patients cured with

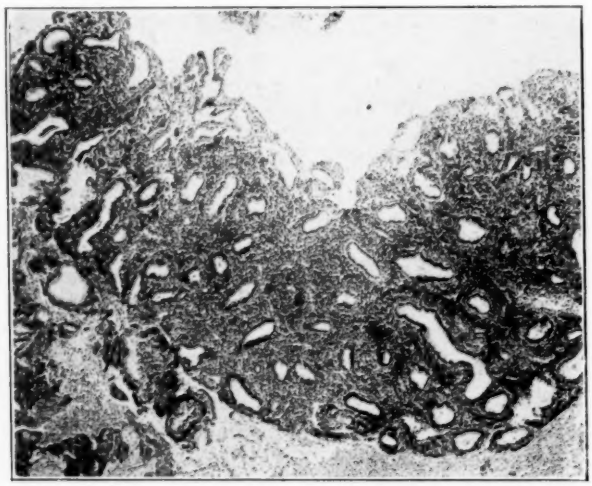

Fig. 1.—Mucosa from case with typical history, showing rather cellular stroma with no great increase in number or size of glands. Patient cured for one and a half years after curettage.

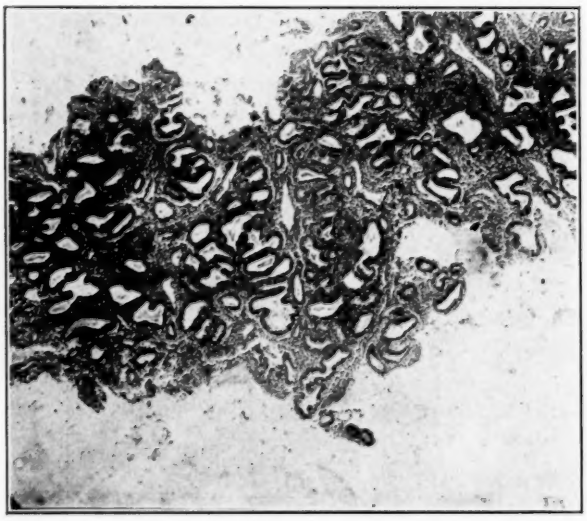

Fig. 2.—Mucosa from a case with typical history, showing increase in number of glands with irregularity of distributon and arrangement. Recurrence of symptoms in two months.

cystic glands, moderate or marked in amount, 6 were near the menopause, 1 was subsequently operated upon for fibroids, 1 showed a small adenoma in the mucosa, and 1 was cured only after four curettings. Of 23 cases that were cured, the mucosa showing a few cystic glands,

5 resembled histologically, and according to their history subinvolution following a pregnancy. Three showed inflammation of the endometrium with typical inflammatory exudate. (Fig. 5.) Two were near the menopause, 3 were associated with polypoid mucosa, 2 had definite adenomatous uterine polyps, and 6 presented no unusual find-

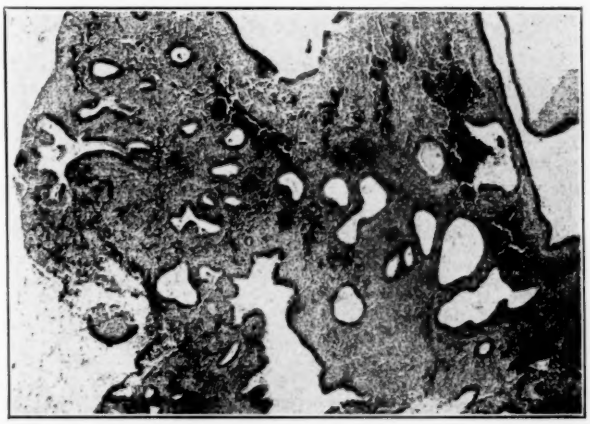

Fig. 3.—Mucosa from a case with typical history. Irregular dilated glands with increase in number. Recurrence of symptoms in two months.

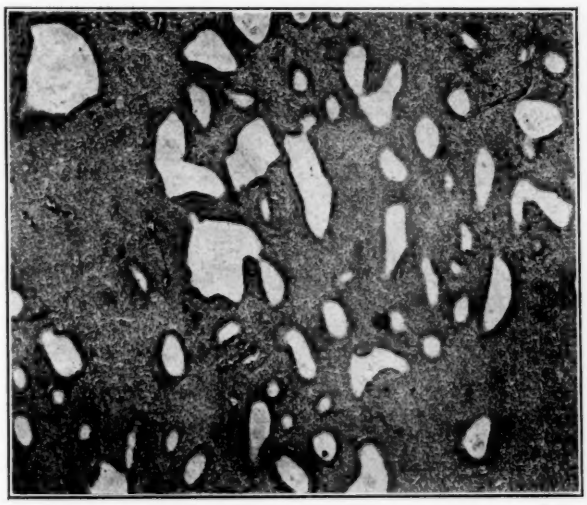

Fig. 3-A.—Mucosa from a case with typical history. Irregular dilated glands with increase in number. Other portions of mucosa showed resting glands (Fig. 8). Recurrence of symptoms in few weeks.

ings. Of the 41 patients cured with normal or atrophic (Fig. 6) mucosa, 9 showed subinvolution, 3 adenomatous polyps, 5 chronic inflammation of the endometrium, 2 had fibroids, 7 were at the menopause, 4 showed evidence of early pregnancy, and 11 presented nothing unusual in the curettings. The cured cases with cystic glands, as can be seen from the above tabulation, were few in number compared with

those with normal or atrophic mucosa. Apparently the etiology of bleeding in this latter type is different from that associated with true cystic hyperplasia. In some cases the histologic picture in the mucosa varied, some areas showing normal resting glands (Fig. 7) other places, dilated, irregular ones (Fig. 3-A) (both pictures from same case).

The total number of unimproved cases was 52. The comparison with the cured cases can be readily followed by having recourse to the charts above quoted. The follow-up period was terminated in these cases after six months by x-ray, radium, or operative treatment, except in cases of puberty bleeding. Of the 52 cases, in 9 the mucosa presented but few cystic glands, 5 of them located in the basal layer only.

Fig. 4.

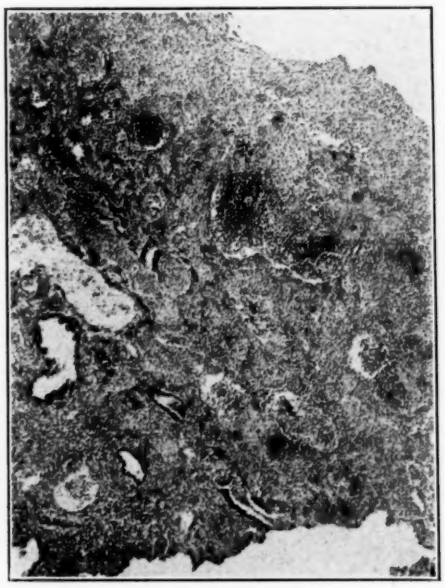

Fig. 5.

Fig. 4.—Mucosa from a case with typical history. Showing polypoid surface. No recurrence of symptoms two years after curettage.

Fig. 5.—Mucosa from case bleeding irregularly for four months with exacerbation, showing purulent exudate and necrosis of mucosa. No recurrence nine months after curettage.

Two of these cases were associated with fibroids and 2 were puberty bleeding. These latter being treated conservatively. Nineteen showed cystic glands, 7 presented nothing unusual, and 3 were associated with fibroids. Two were probably subinvolution cases following incomplete abortions, 2 were cases with polyps, 1 was hydrosalpinx, 1 was inflammatory and 1 showed a few cystic glands in the basal layer. One on the first curetting showed a typical endometrium, the second curetting showed typical cystic glands. In one case the material was insufficient to be accurately diagnosed.

Distribution of gland content showed irregular distribution in 7 per cent of cured cases and 29 per cent of unimproved ones. In 3 per cent of cases where increased content was limited to basals, there were symptomatic cures, while 9 per cent of the cases with basal limitation were unimproved.

In the cases showing a few cystic glands in the mucosa, 24.4 per cent were cured. Sixteen and one-tenth per cent were not cured. In cases showing a marked increase in cystic glands, 14.6 per cent were cured, while 46.7 per cent were not cured. Sixty-one per cent of cases with no cystic glands were cured, while 37 per cent of cases with no cystic glands were unimproved.

Fig. 6.

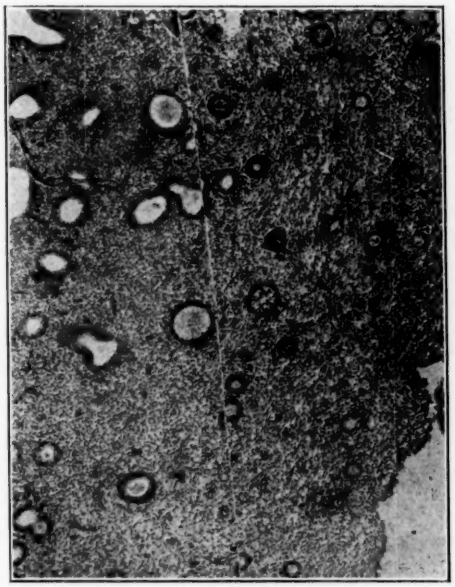

Fig. 7.

Fig. 6.—Mucosa from a case with typical irregular bleeding. Showing atrophic mucosa. No recurrence of symptoms eleven months after curettage.

Fig. 7.—Resting glands in case with irregular cystic glands, see Fig. 3-A, showing variation in histologic picture in same case.

It is likely that many cases classified as functional bleeding are due to other causes, such as endometrial polyps, i.e. (a localized hyperplasia), inflammatory processes or subinvolution. This latter condition must be kept in mind, for it is surprising how often cases of true endocrine type give a history of preceding amenorrhea. Also, a number of cases were noted where, after a period of observation, a definite fibromyoma developed, which, at the original examination was not present, or could not be determined.

It is also likely that the so-called functional bleeding may be due to a variety of causes which give rise to entirely different histologic lesions in the mucosa.

CONCLUSIONS

It is evident that neither from the type of bleeding, the duration of the symptoms nor the histologic data, can a definite prognosis be made as to the possibility of cure. It would seem, however, that in those cases with marked increase in gland content of cystic type with irregular distribution, the possibility of cure by means of curettage is unlikely.

Curettage then may be of curative value in inflammatory cases, those with polyps or polypoid endometrium with scanty or normal gland content, or in those cases where a subinvolution subsequent to a previously overlooked gravidity, presents the clinical picture of a functional metrorrhagia. All cases (except the puberty cases) should be curetted and observed, as a first procedure, and if necessary, with a recurrence of symptoms, recuretted before more drastic steps are taken.

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THE MODERN CONCEPTION AND TREATMENT OF UTERINE BLEEDING*

By C. Jeff Miller, M.D., New Orleans, La.

EVERY woman ought to know, every physician does know, that excessive bleeding at the time of the regular menstrual period, intermenstrual bleeding of any degree, and abnormalities of the menstrual flow at any age of life, are not physiologic. Uterine hemorrhage is one of the commonest of gynecologic affections, but because uterine bleeding at certain periodic times is normal, patients and physicians alike are inclined to minimize the possible consequences of a departure from the normal, with the result that many an unnecessary tragedy occurs. Even moderate bleeding can bring about a train of evil consequences, while a spotting almost too slight to be dignified by the term can be and frequently is the danger signal, the initial warning, of one of the most insidious and most fatal diseases in the whole catalogue of medicine.

*Read before the sectional meeting of the American College of Surgeons, Little Rock, Arkansas, January, 1930.

The older textbooks have little to say on this special subject, and most of what they have to say is wrong, because the whole conception of pelvic physiology has been reversed within the last quarter of a century. We know now that while the uterus is the point of origin of the menstrual flow, it cannot of itself initiate it. We know that the endometrium simply responds to the stimulation of the ovary, whose hormones cause in it first a proliferative and then a secretory activity. We know that behind the ovary lies another force, the anterior lobe of the pituitary gland, whose five hormones exert a profound influence not only upon the general organism but specifically upon the genital tract. We know that while menstruation is a normal function of the uterus, and excessive or irregular bleeding indicates a depraved function, it by no means follows that the perversion is uterine in origin. Indeed, we may safely say that except in those instances in which definite uterine pathology can be demonstrated, the hemorrhage is extrauterine in origin and the uterus is simply an unwitting accomplice to an evil that exists elsewhere.

Unless these facts are constantly borne in mind, our treatment of this very common gynecologic affection is likely to be sadly in error. We are likely to do considerable damage, even as our forefathers did, by unnecessary and meddlesome local treatment. We are likely to do even more damage, as some of us, I am sorry to say, are still doing, by unnecessary and radical surgical treatment. The chapter on the physiology of the female genital tract, particularly in its relation to the endocrine system, still lacks a conclusion, but enough of it has been written to make us question very seriously the wisdom of much that we have done in the past. Menstrual disturbances in older women rarely represent special problems, for, once malignancy is eliminated, entirely satisfactory methods of treatment can be promptly invoked. These methods are almost equally successful in young women, but unfortunately they cannot be so promptly or so generally applied, for the reason that the specific treatment for bleeding is too often a treatment which will permanently terminate functional life, a consideration which cannot and should not be ignored during the reproductive years.

The gynecologists of the last century worked in an era of physiologic darkness, as it were, but that did not prevent their mental processes from being exceedingly shrewd, and many of their general counsels are still applicable. One of Lawson Tait's I am particularly fond of quoting, to the effect that any practitioner seriously neglects his duty who undertakes the treatment of a patient in whom menorrhagia is a symptom without carefully informing her of the utter uselessness of any treatment until there is a clear perception of the conditions present. That warning might well be heeded today. It is plainly impossible to institute rational treatment without an accurate diag-

nosis, and since menorrhagia is only a symptom, not a disease in itself, it is plainly impossible to relieve it without knowing whence and why it arises.

Certain causes of hemorrhage need little elucidation. These include the hemorrhages of pregnancy, which are not essentially a gynecologic consideration; the metrorrhagic bleeding of old syphilitic lesions and of ulcerations from pessaries, which are infrauterine in origin, and of erosions and other obstetric injuries of the cervix; the bleeding due to retrodisplacements, which in my experience is not very frequent unless it is associated with varicosities of the broad ligament or with subinvolution; and the bleeding which is due to organic or infectious diseases, or simply to bad hygiene.

We might well linger on the subject of the bleeding due to uterine neoplasms, not so much polyps or fibroids, in which the diagnosis is clear, as the bleeding which is little more than a spotting and which is so frequently observed in women in or near the menopausal years. It is sometimes due to superficial lesions, it is sometimes due to senile atrophic changes, but in only too many cases it is due to malignancy somewhere in the genital tract, and the patient's very life depends upon promptness of diagnosis and treatment. No matter how trivial it may seem, it demands a searching investigation. Biopsy or diagnostic curettage followed by microscopic study of the tissues should be done routinely and without loss of time. There is a certain physician, I am told, who, when he is consulted by a woman with a lump in her breast, drives her immediately to the hospital in his own car. He may frighten some of his patients unnecessarily, but many of them, I am sure, owe their lives to him, and in the matter of uterine bleeding in women over forty, it might be well for gynecologists generally to follow his example. For early carcinoma is a microscopic, not a physical fact, biopsy, if done properly, is never harmful, and, most important of all, we shall never better our end-results in genital malignancy until we learn to give earnest heed to the slight initial signs which this most treacherous of all diseases exhibits.

We have learned in recent years that endometritis of infectious origin is a very rare affection, and that the hyperplastic changes in the endometrium, once considered pathologic, are most often simply the normal physiologic changes of the normal menstrual cycle. The studies of a host of investigators, among whom it would be invidious to single out individuals, have shown us the specific action of the ovary upon the endometrium, and recently of the pituitary gland upon the ovary, and so there is an increasing tendency and a very correct tendency to assign to ovarian dysfunction all uterine hemorrhages for which a clear local pathology cannot be demonstrated. The uterus is the channel of expression, it is true, but it is ovarian function which has primarily gone astray, and which is especially likely to go astray

at puberty, when the process of menstruation is initiated, and at the menopause, when it is terminated.

In spite of the very excellent clinical and experimental work which has been done along these lines, we are still decidedly in the dark as to how or why ovarian dysfunction occurs, and my own opinion, which I admit is the opinion of a mere clinician, is that we shall remain at least in the twilight until the men who are working in endocrinology and the men who are working in clinical gynecology correlate their endeavors far more than is the case at present. It would be ungracious, for instance, to pick flaws in the brilliant study of Wilfred Shaw, in which he classifies ovarian dysfunction according to the clinical symptoms taken in conjunction with the gross and microscopic ovarian and uterine findings, and yet I cannot refrain from reflecting that the work would have been infinitely more valuable had the endocrine factors been included also.

Moreover, the study of menstrual irregularities of endocrine origin must not end with the study of ovarian deficiency. In the light of our new knowledge we must go behind ovarian dysfunction and consider it in relation to the activity of the anterior lobe of the pituitary gland. More than one recent investigation has pointed out that relation and has intimated a possible pituitary dysfunction as the ultimate source of the ovarian perversion.

At least one pelvic abnormality is quite commonly found in association with uterine hemorrhage of ovarian origin. I refer to the uterine hyperplasia or hyperplastic endometritis which was first described by Cullen and has since been very thoroughly studied by Novak and Martzloff. All of these authors regard it almost as a specific clinical entity which is positively not of inflammatory or infectious origin, and which is characterized usually by gross proliferation of the endometrium and always by the so-called "Swiss cheese" pattern of the glands. If this hyperplastic overgrowth is removed by the curette, it frequently recurs in precisely the same form, which we may take as reasonable proof that the pathology is not local in origin. Since the normal proliferative activity of the menstrual cycle has been proved to be ovarian in origin, and since this overgrowth is simply an excess of this normal activity, it seems equally logical to consider it as a positive indication of ovarian dysfunction.

The treatment of uterine hemorrhage, it goes without saying, depends upon the pathology which gives rise to it. Superficial lesions, cervical erosions, uterine retroversions, constitutional diseases, these offer no special problems. Fibroids of the uterus, however, are a different matter. Small fibroids in young women can be managed by myomectomy, which is the operation of choice in properly selected cases in that it gives excellent immediate and end-results, and in that

it conserves function. Fibroids not of excessive size, provided certain conditions are met, can be managed even more efficaciously in older women, by a simple application of radium, which carries practically a zero mortality and which is successful in probably 90 to 95 per cent of all cases. But large fibroids, and especially fibroids with associated adnexal disease, do not permit, regardless of age, of either irradiation or myomectomy. Only hysterectomy is feasible. In the older woman, almost or entirely past her functional years, this is a matter of slight consequence except for the small operative risk, but in the young woman it is sometimes a tragedy. One has little choice in such a situation, and the best one can do is to be ruthless in the removal of the tumorous uterus and the diseased tubes, and to be as conservative as possible in the retention of the ovaries, so that the patient has at least the cold comfort of being spared the trials of a premature menopause.

Since nonpathologic uterine bleeding is indubitably of endocrine origin, it would seem that its treatment would be perfectly simple, the employment of endocrine therapy. But that, unfortunately, is rarely practical. In the first place, such therapy, which at the best is merely substitutional, is automatically hampered by the fact that most commercial extracts of the ovary contain none of its active principle; Frank found the entire group biologically inert, whether because there was so little of the active hormone in the ovarian tissue from which they were made, or whether what was present was destroyed in the process of manufacture, it is impossible to say. In the second place, absurdly large doses must be administered to achieve any effect at all, aside from the fact that it is generally believed that the active principle, if it should be present, is destroyed by the alimentary juices. Finally, it is very doubtful whether an ovarian hormone representing one stage of a sexual cycle can affect very markedly the internal economy of a woman who is possibly at another stage of hers. It seems to be the old story of the impossibility of duplicating in men the results obtained in mice.

Novak, commenting on the astonishing discoveries of the last few years in the field of endocrinology, says that it would be most unfortunate if the eager clinician should apply half-proved theories or speculative hypotheses to his special problems. I would amend that, to the effect that he most unfortunately has already done so and is continuing to do so. The literature abounds in reports of the brilliant results obtainable from ovarian therapy, reports which either do not impress one with their scientific accuracy, or else are based on pluriglandular therapy in which thyroid extract is often the chief factor. Now it is well known that when the basal metabolic rate warrants it, the employment of thyroid extract often gives excellent results in menorrhagia, and such reports, therefore, are worthless from the

standpoint of ovarian therapy, for it is undoubtedly the thyroid extract which turns the trick. At any rate, it is most significant that the Council on Pharmacy and Therapy of the American Medical Association has recently, after an impartial review, decreed the omission of such ovarian preparations from its list of New and Non-Official Remedies. This may be the beginning of the return to sanity which Frank has been prophesying. For again it is significant that the men who have done the most careful work are the men who are most dubious about the clinical results of ovarian therapy as it must be practiced at present.

The future, however, promises well. Doisy and others have recently isolated the follicular hormone in crystalline form, each grain, it is said, possessing the potency of 2,000,000 rat units, and an active extract of corpus luteum has recently been prepared by Corner and Allen. When the various hormones of the anterior pituitary gland have likewise been isolated, and when all of these products have been made available commercially, and at a cost within reason, certainly a new day will dawn in the management of uterine hemorrhage of ovarian origin.

In the meantime we must use such weapons as we have. The first of these is the curette, and while I admit that it is a much abused instrument and is capable of infinite possibilities of harm, I also contend that it is a most valuable agent in the management of uterine hemorrhage, not only from the diagnostic standpoint, but as a tentative curative measure in young women in the functional years. I raise my voice and I am comforted, in looking over the literature, to note that it is not altogether a solitary voice, to contend that the curette should at least be given a chance, if not more than one chance, to fail before more radical measures are resorted to. I am willing to grant that curettage is an illogical procedure in that it does not reach the source of the trouble and in that the endometrium which is removed frequently grows back in precisely the same pathologic form, but the fact remains that it is sometimes curative, and that it is very often palliative. I have in my office the records of perhaps a dozen women whom I curetted at intervals over many years, and whose menorrhagia was held in check until they had reached the age when irradiation was no longer a radical measure. They shared with me the knowledge that this was the treatment of expediency, but they were willing, for the sake of preserving their functional life, to take the risk of failure, and surely in such instances the end justifies the means.

Quite as illogical, and yet sometimes just as successful, is the use of transfusion in young women. Why it should check uterine hemorrhage I cannot say, and I do not mean to give the impression that it checks it routinely, but it is effective in the occasional case, and it is certainly a measure well worth trying.

With irradiation we step immediately into the realm of radical treatment, not in the sense that life is threatened, but in the sense that function very decidedly is. There is still too little realization of the dangers of this method, a fact which W. J. Mayo expresses excellently when he speaks somewhere of the men who possess a nickel's worth of radium and do a million dollars' worth of damage with it. Radium must sometimes be used in young women, even in young girls, in whom every other measure has failed and for whom hysterectomy would be the alternative, but it must be used very cautiously, in very small doses, and with a full realization of what it may achieve from the standpoint of function. In older women the situation is different, and when the hemorrhage has been proved microscopically to be of benign origin and when there is no history of previous pelvic infection, radium is absolutely specific and the menopausal dose can be given without fear of consequences and with the assurance that success will follow a single application in all but a few cases. When one remembers that only a few years ago the sole treatment for menopausal bleeding was surgery, and radical surgery at that, one must be grateful indeed for this new arm of defense.

Finally there remains hysterectomy, and it is truly a last resort, not only because it destroys function irrevocably, but because, even when function is no longer of consequence, it carries an inevitable risk to life, a risk which should not be assumed, however minimal it may be, if any procedure without it is feasible. In many cases, however, there is no alternative, and for my own part, I would prefer surgery to a menopausal dose of radium in young women in whom every other measure, including submenopausal irradiation, has failed to effect a cure, for it does not destroy the ovaries, and so it is the lesser of two very great evils.

The limitation of time has meant that I could not present in detail the new conception of uterine bleeding and the consequent changes in treatment, but I hope I have at least made the point that menorrhagia is not necessarily of uterine origin, and that when it is not, the treatment should take that fact into account. We are still handicapped by incomplete knowledge, we are still handicapped by inadequate methods of therapy, but at least we are moving in the right direction, and if we keep our heads, the future promises well for the control of this very common, very annoying, and frequently very dangerous gynecologic affection.

512 Hibernia Building.

THE PREVALENT HOUR OF STILLBIRTH

By J. V. DePorte, Ph.D., Albany, N. Y.
(Director, Division of Vital Statistics New York State Department of Health)

ONE of the outstanding achievements in the field of public health has been the reduction in infant mortality. In the State of New York in 1915 (the earliest year for which the registration of births is sufficiently complete), the infant mortality was 99 per 1,000 live births; in 1929 it was 61. Thus, in the fifteen-year period the rate dropped 38 per cent. Again, in 1915, infant deaths represented 16.4 per cent of all deaths. In 1929 the proportion was practically half the earlier figure, 8.6 per cent. While it is true that the decline in the birth rate accounts for some of the decrease in the number of infant deaths, even when the necessary correction is made for this factor, the last percentage is raised only to 9.6.

The progress made in the saving of young lives has been due primarily to the reduced total of deaths among infants over one month old. The death rate among infants over one month and under one year declined from 57.7 in 1915 to 26.9 in 1929, 53 per cent. In the same period the death rate under one month declined but 19 per cent, from 41.5 to 33.7; among the several causes of death during the first month, the mortality from congenital malformations remained practically stationary, 5.6 and 5.7, while the rate from injuries at birth actually increased from 3.9 to 5.5.

The stillbirth rate (per 1,000 total births) was 41.4 in 1915 and 40.2 in 1929. The average rates for the successive quinquennia 1915-1919, 1920-1924, 1925-1929 were 40.7, 41.5, and 41.0. With the decline in infant mortality the practically stationary rate of stillbirths takes on an increasing importance. (See Fig. 1.) While sixteen years ago, for every 100 infants who died before reaching the first year of life, 44 were born dead, in 1929 the corresponding proportion was 69.

Let us summarize briefly the present state of knowledge regarding stillbirths:

In somewhat more than half of the cases described in the literature on this subject the deaths of the infants occurred before labor; the others, during the labor. A large proportion of stillbirths, roughly about one-third, are premature. We know but little about the causes inherent in the organism of the infant that are responsible for these deaths. Our knowledge of the causes relating to the condition of the mother is more extensive. Most frequent among them are syphilis, chronic inflammation of the kidneys, tuberculosis, general debility, alcoholism, and the febrile diseases, particularly influenza and pneu-

monia. As an illustration of the last statement, we may note that the highest monthly stillbirth rate in the State of New York (63 per 1,000 total births) was recorded in October, 1918, at the peak of the influenza epidemic.

The causes of stillbirths which occur during the process of birth are better known. The constitution of the mother, the position of the child, and various accidents at birth, are the important factors. The risk of a stillbirth, when mechanical assistance becomes necessary because of the mother's condition or the abnormal position of the infant, is almost nine times as great as in normal births. In the words of P. Strassman* "no other day contains so many dangers to the life of man as the day of birth, with which ends the contemplative life of peace within his mother's organism."

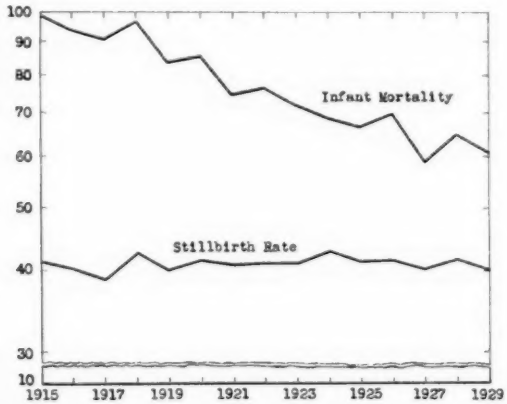


Fig. 1.—Stillbirth rate and infant mortality, New York State, 1915-1929.

Of the indirect causes of stillbirth the following have been noted: the sex, size and weight of the infant, the multiplicity of birth, the order of birth, the age and economic status of the mother.

The relative importance of most of these factors can be expressed quantitatively. Let us consider the experience of the Birth Registration Area for 1928, the latest year available and of the State of New York, exclusive of New York City (data for the City not being given in necessary detail), for the ten-year period 1920-1929.

The number of live births in the Registration Area in 1928 was 2,233,149; stillbirths, 89,765. The corresponding numbers for Upstate New York for the ten years 1920-1929 were 1,004,461 and 37,250.

The figures in Table I show that:

Stillbirths were relatively more numerous among males.

The stillbirth rate among illegitimate children was almost double the rate among legitimate children in Upstate New York, the disparity being even greater in the Birth Registration Area.

TABLE I. STILLBIRTH RATES PER 1,000 TOTAL BIRTHS (INCLUDING STILLBIRTHS)

	BIRTH REGISTRATION AREA 1928	NEW YORK STATE (EXCL. OF NEW YORK CITY) 1920-1929
Sex:		
Both sexes	39	36
Male	42	40
Female	34	32
Legitimacy:		
Legitimate	38*	35
Illegitimate	87*	64
Multiplicity of Birth:		
Single	38	35
Multiple	78	72
Color:		
White	34	35
Colored	75	61
Nativity of White Mothers:		
Native	33	34
Foreign	40	39
Order of Birth:		
First child	Not available	42
Second child		26
Third child		28
Fourth child		31
Fifth child		35
Sixth child		39
Seventh child		43
Eighth child		45
Ninth child		52
Tenth child		59
Eleventh child		65
Twelfth child and over		78
Age of Mother:		
Under 20 years	44	33
20-24 years	33	29
25-29 years	32	30
30-34 years	36	36
35-39 years	48	49
40-44 years	60	65
45 years and over	86	95

*Exclusive of California and Massachusetts.

The risk of a stillbirth among multiple births was more than double that among single births. It may be interesting to add some details for the Birth Registration Area not given in Table I. Twin births in 1928 numbered 26,794 or 53,588 individuals. In 1,756 births (6.6 per cent) one infant was born alive and one stillborn; in 1,175 births (4.4 per cent) both were stillborn. The stillbirths numbered, therefore, 4,106 individuals or 7.7 per cent of the total. Triple births numbered 305 (915 individuals). In 47 births (15.4 per cent) two of the infants were born alive and one stillborn; in 12 births (3.9 per cent) one infant was born alive and two stillborn; and in 20 triple births (6.6 per

cent) all of the infants were stillborn. The stillbirths numbered 131 individuals or 14.3 per cent of the total. There were also recorded three quadruple births, in one case all of the infants were born alive, in the other two all of the infants were stillborn.

The stillbirth rate for colored infants was considerably higher than for white infants.

The stillbirth rate was greater among infants whose mothers were foreign-born than among those whose mothers were native-born.

The risk of a stillbirth, with the single exception of primiparae, was directly related to the total number of children born to the mother. The stillbirth rate was least among mothers who were giving birth to a second child. The rate increased with each successive birth to an absolute maximum among mothers with twelve or more children. Among first-born, the rate was almost as high as among children who were seventh in order of birth.

Among infants whose mothers were in the youngest age group, under twenty years, the risk of a stillbirth was higher than in the next two age groups, the rate between the ages of 20 and 29 being the minimum. After the thirtieth year the rate mounted with age to a maximum in the group of oldest mothers, forty-five years and over.

An analysis of the live and stillbirths in the State of New York, exclusive of New York City, in 1929 suggests the possibility of still another factor, namely, the hour of birth. The distribution of these births according to hour is shown in Table II.

TABLE II

HOUR OF DELIVERY	LIVE BIRTHS	STILLBIRTHS	
		NUMBER	RATE PER 1,000 TOTAL BIRTHS
Total	93,230	3,398	35
Midnight – 2 A.M.	11,990	409	33
3 A.M. – 5 A.M.	13,289	415	30
6 A.M. – 8 A.M.	12,699	370	28
9 A.M. – 11 A.M.	13,001	442	33
Noon – 2 P.M.	9,604	366	37
3 P.M. – 5 P.M.	10,232	474	44
6 P.M. – 8 P.M.	9,910	418	40
9 P.M. – 11 P.M.	11,927	451	36
Hour not stated	578	53	—

The maximum number of live births (13,289) was recorded between the hours of three and six in the morning, exceeding by more than 38 per cent the minimum (9,604) between twelve and three in the afternoon. The distribution of stillbirths was, in general, opposite that of live births. Most of the stillbirths occurred during the day, the maximum (474) falling between the hours of three and six in the afternoon and the minimum (370) between six and nine in the morning. The stillbirth rate (see Fig. 2) was highest (44) between three and six in

the afternoon, greater by 57 per cent than the minimum (28) between six and nine in the morning. The next high rate (40) was recorded between six and nine in the evening. All of the stillbirth rates between noon and midnight were greater than the rates between midnight and noon. The mathematical probability that the difference in the distribution of the stillbirths and live births is merely one of chance is less than one in a million or, statistically speaking, the variation of the stillbirth rate is certainly significant.*

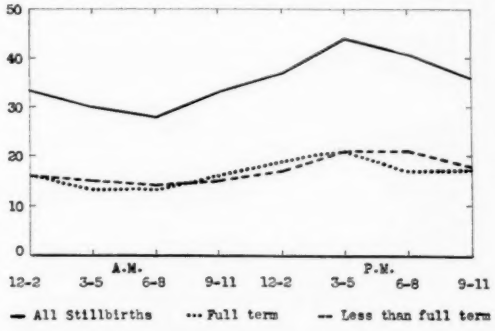


Fig. 2.—Stillbirth rates according to hour of delivery, New York State (exclusive of New York City), 1929.

Grouping the live and stillbirths according to seasons of the year we find that the excess of the maximum over the minimum rate was practically the same for each quarter (Table III).

TABLE III

	MAXIMUM RATE	MINIMUM RATE
January—March	50	29
April—June	49	29
July—September	40	24
October—December	42	29

The maximum rates were recorded at 3 to 5 P.M. with the exception of the three months from April to June when the peak occurred at 6 to 8 P.M., the next highest rate during those three months (45) falling at 3 to 5 P.M. The minimum rates were reached at 6 to 8 A.M. with the exception of January to March, when the rate occurred during the earlier hours, 3 to 5 A.M.; the rate at 12 to 8 A.M. (29) being the next smallest.

Separating the stillbirths into full term and less than full term, we have the following (Table IV).

The degree of variation of these two sets of rates, as indicated by their standard deviations, was practically the same, 2.62 and 2.50. The maximum rates of full term and less than full-term stillbirths,

*An analysis of the live and stillbirths for the first four months of 1926 showed almost the same variability of the stillbirth rate. See J. V. DePorte-Maternal Mortality and Stillbirths in New York State: 1915-1925. Published by the New York State Department of Health.

TABLE IV

HOUR OF DELIVERY	STILLBIRTH RATES	
	FULL TERM	LESS THAN FULL TERM
Midnight – 2 A.M.	16	16
3 A.M. – 5 A.M.	13	16
6 A.M. – 8 A.M.	13	14
9 A.M. – 11 A.M.	16	15
Noon – 2 P.M.	19	17
3 P.M. – 5 P.M.	21	21
6 P.M. – 8 P.M.	18	21
9 P.M. – 11 P.M.	17	18

recorded between three and six in the afternoon, were identical (21); the minimum rates (13 and 14) were recorded between six and nine in the morning.

We have thus found that the rate of stillbirths, both full term and less than full term, definitely varied according to the hour of delivery and that the variation of the total stillbirth rate was practically the same during all seasons of the year.

If this variation is not one of chance—what is the causative factor? The facts contained in this paper were brought to the attention of some of the leading obstetricians in this country; with their kind permission, we shall quote from several replies:

"It is a great surprise to me, as I should have placed it in the early morning hours, and would have attributed it to the fact that the doctor, becoming exhausted and impatient after being up a considerable part of the night, resorted to operative interference in order to get home in time for breakfast and the work of the day. This, however, is only a personal impression, and is not based upon figures." Dr. J. Whitridge Williams, The Johns Hopkins Hospital.

"Had you asked me when most of the babies died I would say between 1 and 7 A.M., basing the guess on the fact that the doctors are not at the peak of their ability during these hours. Some years ago I knew a physician who was never late to dinner, which meant that when the time came he would hurry the delivery by various measures. Possibly such action might have some bearing on the vital statistics." Dr. Joseph B. DeLee, The Chicago Lying-In Hospital.

"(I) would suggest that if it is possible to do so, you check the incidence of operative deliveries during the different time periods which you have analyzed. You might find that the incidence of operative deliveries would be higher at certain times of day than during the other periods." Dr. Fred L. Adair, University Clinics, The University of Chicago.

"The only explanation I can give, and it may be entirely erroneous is—that during the late afternoon hours there may be more operative interference and a greater use of pituitrin because of the fact that most physicians are particularly busy at this time, either in their offices or in making rounds to their different patients. In the early morning hours, on the other hand, they are perhaps slower to terminate any given case owing to the courage it takes to get out of bed at such time." Dr. Ralph W. Lobenstine, New York City, Regional Consultant in Obstetrics, New York State Department of Health.

"I feel that the real reason (for our high maternal mortality) is the lack of proper training in the medical schools. We cannot expect better results until the present requirements by the state for practice in obstetrics are changed. Only

those physicians and midwives who have received adequate training should be allowed by the state to assume the responsibility for maternity care. The delivery of at least 40 cases under proper supervision should be required.

"The extension of antenatal and postnatal work would be of great value but only if physicians properly trained are in control of these clinics. I also feel that the causative factors of puerperal morbidity and mortality are already sufficiently known and further research is unnecessary. I am sure the application of the knowledge already available by physicians and midwives properly trained would solve this problem.

"In regard to the causes of the high stillbirth rate during the afternoon hours I have only two opinions. During the afternoon there are a larger number of cases which are delivered after a long labor, as labor usually begins during the previous night or early morning. Also at this time of day physicians are usually anxious to terminate the case owing to the demands of other work. The low mortality in the early morning being due to the fact that the patients are more frequently allowed to deliver spontaneously. In one hospital where a record of time of operation was made it was found that during the night there were very few operative deliveries especially between 2 A.M. and 7 A.M." Dr. Frederick W. Rice, New York City—Regional Consultant in Obstetrics, New York State Department of Health.

"Afternoons are the busy hours of the doctor's day, when we might feel more constrained to hasten deliveries." Dr. Paige E. Thornhill, Watertown, N. Y.—Regional Consultant in Obstetrics, New York State Department of Health.

The suggestion that operative interference, by implication frequently unnecessary, is probably responsible for the high stillbirth rates in the afternoon and evening introduces a factor which is certainly within the range of direct control. In other words, it seems likely that the stillbirth rate could be reduced merely "by the application of the knowledge already available."

Schumacher, Paul: Intravenous Pyelography in the Pregnant and Non-Pregnant Woman. Zentralbl. f. Gynäk. **54:** 1474, 1930.

Uroselectan, intravenously, gave very good visualization of the ureters and kidney pelves. The author previously had tried and abandoned several other preparations, one of which had resulted in a violent iodine reaction. With uroselectan the only reactions noted were reddening of the face and mild elevation of the pulse rate. The blood pressure remained unchanged. Pregnant women, because of the atony and distention of the ureters coupled with more or less urinary stasis, gave results far exceeding the author's expectations. He is convinced that uroselectan offers a safe and effective method of obtaining pyelographies by intravenous administration of contrast material and represents a great improvement on old methods.

WILLIAM F. MENGERT.

THE PREVENTION OF OBSTETRIC COMPLICATIONS BY DIET AND EXERCISE*

By Arthur W. Bingham, M.D., East Orange, N. J.

THE practice of obstetrics has passed through various eras. Forty or fifty years ago was the era of noninterference. Patients were allowed to go on in labor for days and sedatives were seldom used.

This was followed by an era of excessive interference. Labor was induced at any time convenient for all concerned and the baby was delivered on scheduled time, no opportunity being given for a natural birth or for the separation of the placenta. If labor did not proceed rapidly enough a cesarean section was performed.

Now we are entering the era of common sense obstetrics with more attention given to preventive treatment. An attempt is made to follow nature; sedatives are given when indicated; and care is taken not to hurry the labor. Assistance is given when found necessary. Prenatal care has done much to improve the obstetrics of today. Can it not do more?

Prenatal care is carried on along two different lines. One might be called the informative method and the other the preventive. In the first, records are kept regarding blood pressure, weight, and uranalysis, etc.; and when abnormalities are found the proper treatment is prescribed. In the second or preventive method, besides keeping these records, advice is given in an attempt to prevent complications before the signs of approaching trouble are clear.

In watching the weight of cases of pregnancy over a long period it became apparent that most of the patients who gained much weight or gained too rapidly had more complications than those who gained only moderately. The fact that a few patients have normal labors and deliveries in spite of excessive weight proves that there are exceptions to the rule and these should not mislead us. The study of a considerable number of cases has proved that in general a patient who has gained weight only moderately and who has exercised in the open air will seldom show signs of toxemia unless the kidneys were damaged before pregnancy took place.

The control of weight cannot as a rule be accomplished simply by diet. It is necessary to have the patient exercise in the open air. Many patients tell us they have so much to do about the house that they do not need to walk. This housework does not take the place of a walk in the open and a short walk should be urged for such pa-

*Read at the Obstetric and Gynecologic Section of the Academy of Medicine of Northern New Jersey, January 27, 1931.

tients after the first three months. Walking in the open improves metabolism better than anything else these patients can do, and by improving metabolism there is less toxemia and anemia. Patients in the wards are apt to show more anemia than private patients partly because they do not always get the right food but mainly because they are working in the house all day and do not get sufficient exercise in the open air.

What is overweight in pregnancy?

The average woman of medium size should not gain more than 15 or 20 pounds during her pregnancy. Stout patients should gain less and tall patients may be allowed a few pounds more. The weight should not increase quickly, as a sudden gain will frequently precipitate an attack of toxemia although the total weight may not be excessive.

The regulation of weight by diet and exercise accomplishes several things:

First, most important it helps to prevent toxemia,

Second, patients are less anemic,

Third, it makes labor easier by reducing the amount of fat in the pelvis.

A patient came to me with a history of difficult labor and forceps delivery with her first pregnancy and a more difficult delivery with the second resulting in a stillbirth. Her physician had recommended a cesarean section in the event of another pregnancy. She was two months' pregnant when first seen by me and weighed 200 pounds. It was suggested that she reduce a little and let the question of cesarean section rest. With the aid of diet and exercise she gained only 3 pounds in the next seven months. She had a very short labor and a living child was delivered by easy low forceps, the pelvis being contracted at the outlet. The baby weighed the same as the one which was stillborn (8¼ pounds) but the mother weighed 40 pounds less than at the previous labors.

Fourth, the size of the baby is generally less than if the weight of the patient is excessive. We all know that the weight of the baby cannot always be controlled especially if the patient is quite heavy at the beginning of pregnancy as in the last case reported, but the average will weigh less if the mother's weight is kept down and the labor as a rule will be easier. The weight of the baby is influenced by the amount of exercise the patient takes as much as by the food taken. While the patient considers this the most important reason for diet and exercise, it is really the least important.

Recently a patient was delivered by me who two years ago—after a difficult forceps case, had a stillbirth weighing 9 pounds. Her external conjugate was 17 cm. and she had gained 30 pounds. This time with careful diet and exercise she gained 10½ pounds and had a normal delivery. Baby weighed 7¼ pounds. The patient is in excellent condition as well as her baby. Many similar cases could be cited but it is not necessary to take the time.

The obstetric complications which may be reduced by diet and exercise may be stated as follows: toxemia, eclampsia, accidental separation of placenta, difficult forceps, lacerations, induction of labor, cesarean section, subinvolution, postpartum hemorrhage, postpartum shock, infections, transfusions for anemia and hemorrhage, prolonged convalescence, premature babies, stillbirths.

It is evident that if toxemia alone can be avoided and the patient's general condition improved many of the other complications can be reduced. Tables I, II, III and IV indicate some of the results which may be accomplished by controlling the weight of the patient by diet and exercise.

TABLE I

POUNDS GAINED	NONTOXIC CASES		TOXIC CASES				PER CENT MARKED TOXIC CASES	MILD TOXEMIA		PER CENT TOTAL TOXIC CASES
			ECLAMPSIA		MARKED TOXEMIA					
	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.		PRIM.	MULT.	
1-10	57	75	–	–	–	–	–	–	1	0.7
11-20	277	298	–	–	3	1	0.6	5	–	1.5
21-30	211	253	–	–	7	2	1.8	9	8	5.3
31-	54	63	2	–	4	2	6.1	3	3	10.6
1-20	334	373	–	–	3	1	0.5	5	1	1.3
21-	265	316	2	–	11	4	2.7	12	11	6.4
Cases No. 1-669	301	339	2	–	10	3	2.2	8	6	4.3
670-1338	298	350	–	–	4	2	0.8	9	6	3.1

Table I shows the normal and toxic cases in 4 groups according to gain in weight. The cases of mild toxemia are those showing a rise in blood pressure or a trace of albumin at the last prenatal visit. They were at full term and required no treatment. The total number of cases studied was 1,338 and included only patients who had been given prenatal care by me for at least four months. Hypertension and nephritic cases were omitted as they are abnormal from the start. The gain in weight was figured from the normal weight before patient became pregnant. The second grouping on Table I shows that a patient gaining more than 20 pounds is nearly 5 times as likely to become toxic as one who gains less than 20 pounds. The single mild toxic patient in the 1-10 group had two sisters who had eclampsia and her father's death was due to hypertension so that it is possible she is potentially a nephritic. All of the marked toxic cases in 11-20 group were induced so had no chance to gain more. The third grouping on Table I shows the total cases divided in half, the second half showing an improvement over the first. The improvement is not so marked as all of the cases were given careful prenatal care. There were no cases of eclampsia in the last half.

Table II shows the same grouping as Table I but in reference to cesarean section operations, inductions, and premature infants due to toxemia. All the cesarean sections due to toxemia were done on patients who had gained over 20 pounds and the percentage of inductions for toxemia was doubled. The percentage of premature infants due to toxemia was tripled. In the last half of the group the cesarean sections were reduced and 7 of the 11 cases were patients who had had previous sections. In the first half only one patient had had a previous cesarean section. Inductions were reduced as well as premature infants.

TABLE II

POUNDS GAINED	TOTAL NO. OF CASES		CESAREAN SECTIONS		CESAREAN SECTIONS DONE FOR TOXEMIA		PER CENT TOXIC CESAREAN SECTIONS	INDUCTIONS		INDUCTIONS FOR TOXEMIA		PER CENT TOXIC CASES INDUCED	PREMATURES DUE TO TOXEMIA		PER CENT PREMATURES DUE TO TOXEMIA
	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.		PRIM.	MULT.	PRIM.	MULT.		PRIM.	MULT.	
1-10	57	76	1	4	–	–	–	1	–	–	–	–	–	–	–
11-20	285	299	5	4	–	–	–	4	5	4	1	0.8	1	1	0.3
21-30	227	263	4	8	1	1	0.4	2	1	2	1	0.6	–	1	0.2
31-	63	68	3	4	2	–	1.5	3	2	3	2	3.8	2	1	2.2
1-20	342	375	6	8	–	–	–	5	5	4	1	0.6	1	1	0.2
21-	290	331	7	12	3	1	0.6	5	3	5	3	1.2	2	2	0.6
Cases No.															
1-669	321	348	11	9	3	–	0.4	6	7	6	3	1.3	2	2	0.5
670-1338	311	358	2	11	–	1	0.1	4	1	3	1	0.5	1	1	0.2

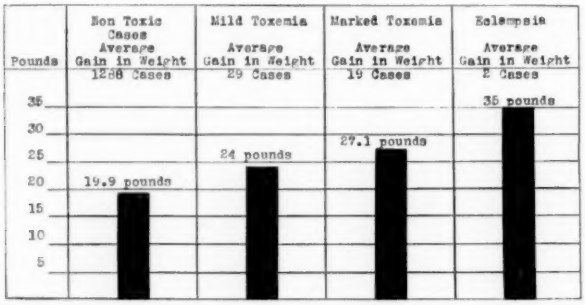
Table III shows the average weight of babies in the different groups. The babies in the 1-10 group were not undersized nor delicate and yet they weighed about 1 pound less than those in the 31 pounds + group. This pound might make quite a difference in many cases of labor. It also shows the average hours in labor; the difference being especially marked in primiparae. The last half of the group shows very little change in weight but the average length of labor has been reduced.

Table IV shows all the cases divided into 4 classes and their weights averaged in each class. The average weight of the 1,288 nontoxic cases is 19.9 pounds, the 29 mild toxic cases average 24 pounds, the 19 marked toxic cases average 27.1 pounds, and the 2 eclamptic cases average 35 pounds; showing that when a patient gains more than 20 pounds she is in greater danger of toxemia as her weight increases.

TABLE III

POUNDS GAINED	AVERAGE WEIGHT OF BABY		AVERAGE HOURS IN LABOR	
	PRIM.	MULT.	PRIM.	MULT.
1-10	6.9	7.2	10.4	6.0
11-20	7.2	7.3	13.4	7.3
21-30	7.5	7.8	14.2	7.5
31+	7.8	8.3	16.4	7.6
1-20	7.1	7.3	12.9	7.1
21+	7.5	7.9	14.7	7.5
Cases				
No. 1-669	7.4	7.5	14.9	8.2
670-1338	7.3	7.7	12.5	6.4

TABLE IV



How is this regulation of diet and exercise managed? Each patient is handled individually depending on her weight, height, normal blood pressure, and past history. As a rule there is no attempt to control the weight during the first three months of pregnancy as most patients gain very little then. It has been found that carbohydrates should be largely taken during this period. In cases of nausea they should be taken every two hours. Meat, eggs, milk, and fruit should be taken in moderation.

After three months carbohydrates should be cut down and more vegetables and fruit taken. A moderate amount of milk should be taken depending somewhat on the gain in weight. Red meats are

omitted during the last six weeks although it may be that this rule is not so important as formerly considered.

As a rule the patient is told to take a general diet for the fourth month, care being taken not to overeat. If, after one month the gain is not over 4 pounds, she may be allowed to continue on the same diet another month being cautioned to omit sweets and take starchy foods sparingly. If patient gains less than 4 pounds, she goes on for another month but if she gains 4 pounds, or more, she is told to restrict starchy foods still more. Roughly speaking the gain during the first three months will be very little, then the gain each month should be approximately 4, 3, 3, 3, 2, and 2 pounds, and the diet regulated accordingly. Often if the patient is in good condition there will be a loss of weight during the last two weeks. While the diet is being watched the amount of exercise in the open air must be prescribed.

During the first three months very little exercise is required. There will be less nausea and less danger of miscarriage if this rule is followed. However, if there is very little nausea and no danger of miscarriage a moderate amount of walking is good. After the third month, the patient should start walking about one-half hour daily and this regulated to a longer or shorter time depending on weight and general condition of patient. A few patients in danger of premature labor will not be able to walk far, while others may walk one or two hours daily. This may be continued up to the end of pregnancy.

If in spite of moderate diet and exercise, weight is increased too rapidly; before signs of beginning toxemia appear, the patient's diet is supplemented as follows: Twice weekly or every other day as indicated regular meals are discontinued and patient takes one glass of milk with one cracker at 8 and 11 A.M., and 2, 5, and 8 P.M. Two oranges are allowed during the day and possibly one green vegetable and a cup of coffee. If care is taken not to increase the diet over the average amount on the off days this will in most cases reduce or check the increase in weight without much discomfort to the patient. When weight is controlled, more vegetables and tomato or lettuce salad may be added to the milk diet on these days. Various combinations may be used. By allowing the patient to eat moderate meals on alternate days with the milk diet the weight can be controlled without the diet becoming tiresome.

CONCLUSIONS

No attempt has been made in this paper to cover the subject of prenatal care, the single idea being to emphasize a feature which is more or less neglected. Over 4,000 women die annually in the United States from toxemia including eclampsia. If by attention to diet and exercise the incidence of toxemia and eclampsia alone can be greatly reduced, is it not worth while? When I survey the obstetric cases of the

past with those of today, I realize that the work has become simpler and the results so much better that credit is naturally given to the effort to instruct patients on the subject of diet and exercise.

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219 HARRISON STREET.

ANTERIOR PITUITARY HORMONE IN THE CEREBROSPINAL FLUID DURING PREGNANCY

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SINCE Cushing and Goetsch[1] in 1910 called attention to "the presence of a substance in the cerebrospinal fluid which gave the same reactions as the pars nervosa itself," there has been extensive research regarding the presence of pituitary hormone, calcium, and other content of the fluid.[2, 3] Whether the pituitary gland secretes directly into the cerebrospinal fluid[4] or whether the hormone present is a filtrate from the blood stream is still a moot question. The presence of pituitary substance in spinal fluid has been studied in pregnancy and parturition.[5] All of this work has been done with reference to the posterior pituitary hormone.

Until the epoch-making work of Aschheim and Zondek in 1927, there had not been available a test for the anterior pituitary hormone. For interpretation of the reactions obtained with this test, the German authors have selected the symbols HVR-I, -II, and -III, as referring to *hypophysenvorderlappen reaktion.* The English analogy, anterior pituitary reactions, is designated APR-I, -II, and -III. APR-I is that reaction characterized by follicle formation in the ovary and is the result of stimulation of the ovary by that element of the anterior pituitary hormone called Prolan A. The APR-II refers to the production of hemorrhagic follicles (the "*Blutpunkte*") and APR-III is the designation of corpus luteum formation. Reactions II and III are the results of stimulation by the Prolan B factor of the anterior pituitary, Squier and Wertheimer[6] in 1929, using the Aschheim-Zondek technic, with immature female mice as test animals, performed two series of experiments with the spinal fluid of grown dogs. They were not interested in the reaction as a pregnancy test. The mice of this series gave neither the APR-I, -II, or -III. These workers concluded that the anterior pituitary hormone is not present in the cerebrospinal fluid of grown dogs. Ehrhardt[7] reported a series of 50 cerebrospinal fluids taken by ventricle puncture, suboccipital puncture, and lumbar puncture from children, men, and women suffering from various disease conditions and also fluid from cadavers. In this series are spinal fluids, all lumbar punctures, from 18 pregnant women. He tested for the anterior pituitary substance by using the usual mouse test, substituting spinal fluid for urine. In this series

in no case was an APR-II or -III obtained. Three cases of eclampsia returned a three-plus APR-I, one portio carcinoma in pregnancy, a three-plus APR-I, and one preeclampsia and one pregnancy dermatitis each gave a one-plus APR-I. Whether the positive reaction in toxemic patients is due to an overflow of hormone from the blood due to an increased permeability of the capillary wall or to an overfunction of the anterior pituitary with direct delivery into the cerebrospinal fluid, is not determined.

One of us, in a previous paper, has discussed the Aschheim-Zondek reaction, as originally described, together with various modifications which have been offered. In this laboratory the reaction has been studied not so much as an actual test for pregnancy, but as an index to the presence of the pituitary hormone in the pregnant state. Therefore, the rapidity in the number of hours with which the reaction could be obtained, the earliest stage of pregnancy which gives the reaction,

Fig. 1.—Ovary of noninjected doe.

Fig. 2.—Ovary of 1200 gm. doe, injected intravenously with 3.5 c.c. cerebrospinal fluid. Autopsied forty-eight hours later. Note lack of enlarged follicles, hemorrhage, and corpora lutea.

and allied questions have not been given major consideration. The technic as performed here is to inject 3.5 c.c. of blood serum intravenously into the marginal ear vein of a 1,200 to 1,600 gm. virgin female rabbit. After thirty-six to forty hours, the animal is either killed or operated upon. The vagina, uterus, and ovaries are inspected. In a positive test the vagina is open with a mucoid discharge, the uterus is enlarged and engorged, and the ovaries are enlarged and show one or many hemorrhagic follicles, and/or corpus luteum formation, the APR-II and -III of the current literature. Positive results have not necessitated microscopic examination except as a means of permanent record or in doubtful APR-I.

The present report is a summary of experiments performed on the blood and spinal fluid of 5 pregnant women. As originally planned,

this work was to have been more extensive in character. After the five cases recorded here, the work of Ehrhardt was found and as much as the results are parallel, this report serves as a confirmation. Further tests will be performed with fluid from the toxemias of pregnancy. The procedure followed was to perform a lumbar puncture withdrawing about 4 c.c. of spinal fluid and a vein puncture withdrawing about 10 c.c. of blood. After obtaining the blood serum by centrifugation, 3.5 c.c. each of blood serum and spinal fluid were injected intravenously into rabbits of approximately the same weight. After the arbitrarily allowed time of thirty-six to forty hours, the animals were operated upon or killed and the reactions observed. By this technic we felt that as nearly standard conditions as possible were obtained and the degree of reaction of the two fluids were definitely comparable; the blood serum reaction serving as a control for the spinal fluid.

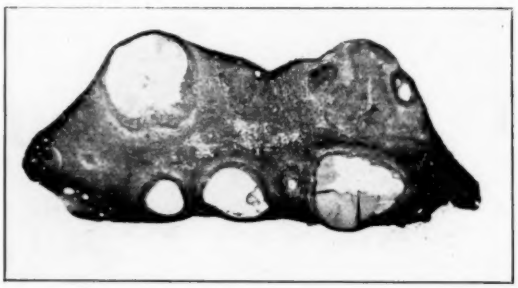

Fig. 3.—Ovary of 1300 gm. doe injected intravenously with 3.5 c.c. blood serum. Autopsied forty hours later. Note hemorrhagic follicles and beginning luteinization.

TABLE I

PATIENT	GRAVIDA	AGE	GESTATION	COLOR	ABNORMALITIES	REACTION IN RABBIT OVARY	
						BLOOD	CEREBRO-SPINAL FLUID
L.S.	I	18	32 wk.	N	Condylomas	II and III	I (slight)
A.S.	II	32	16 wk.	W	Threatened Miscarriage	II and III	I (slight)
L.T.	II	21	24 wk.	N	Contracted Pelvis	II and III	I (slight)
M.H.	IX	28	30 wk.	N	Normal	II and III	I (slight)
V.W.	I	26	28 wk.	N	Hypertension Preeclamptic	II and III	I

SUMMARY

From our findings which are essentially in accord with the results of Ehrhardt, we are permitted to draw the conclusion that the anterior pituitary hormone or at least the Prolan B is not present in the cerebrospinal fluid or, if present, is in a much less concentration than in the blood. This seems to indicate rather definitely that the hormone element of the anterior pituitary which causes hemorrhagic follicles

and corpus luteum formation is not secreted directly into the cerebrospinal fluid, but into the blood stream.

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SOME NOTES ON STERILITY DUE TO OBSTRUCTION IN THE UTERINE TUBES*

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STERILITY is an intricate and extensive subject and the question of the cause and treatment of marital barrenness is one of the most difficult problems in gynecologic practice. The desire of a sterile wife mated to a potent husband to bear offspring and to submit to any measure to attain that end should be heeded.

The causes of sterility in the female are many. Sterility may be primary or secondary. It is primary if conception has never occurred, and secondary if one or more conceptions have preceded an indefinite period of barrenness.

In about one-third of all sterile marriages the male is at fault. The cervical and vaginal secretions are at times hostile to the spermatozoa. These conditions are tested by the Hühner reaction, which is valuable because of its simplicity and the definiteness of its results. Living spermatozoa in the cervical canal tell us at once that the cervix is in right position to receive the semen and that the cervical secretion is compatible with the seminal fluids. If dead spermatozoa are found then a condom test is indicated. If the latter shows live spermatozoa, then the deduction may be drawn that the husband is potent.

Obstruction in the uterine tubes the result of preceding infections is a frequent cause of acquired sterility. Giles states that about 15 per cent of all women under twenty-four years of age have closed tubes. The introduction of accurate methods of diagnosis as tubal gas inflation and the injection of aqueous solutions or oil suspensions of iodine with subsequent radiography has not only improved the diagnosis of sterility but has incited renewed interest in the treatment of this form of acquired sterility. Exploratory laparotomies are no longer justifiable to make a diagnosis of tubal obstruction as hysterosalpingography enables one to visualize the lesion and its location.

*Read before the Chicago Gynecological Society, February 26, 1931.

The therapeutic methods for the relief of tubal obstruction are, of course, surgical and the kind of operation indicated can be predetermined in the majority of cases after hysterography.

Acquired obstruction of the uterine tubes is mostly of an infectious origin. The infection may reach the tubes through an ascending, descending or hematogenous route. The ascending infection is mainly a gonorrheal one, though pyogenic bacteria and those unknown specific organisms of exanthematous infections may cause it. The descending infection is produced by bacteria inhabiting the intestinal tract and found with appendicitis, sigmoiditis, tuberculous enteritis, typhoid fever, actinomycosis, among others. By continuity through adhesions the infection may invade the pelvic organs. The hematogenous infections may result from primary foci in the respiratory tract as streptococcus sore throat, pulmonary tuberculosis, acute pneumonia, etc.

Recovery of the tubes from the infection may be complete or incomplete. It is complete (1) if the cause of the inflammation is removed; (2) if the dead tissue, the inflammatory exudate, and the proliferative products are completely resorbed; and (3) if the injured tissue is replaced by normal tissue by a process of resolution or regeneration. The recovery is complete: anatomically, biologically, and physiologically. In incomplete recovery the damaged tissues are replaced by morphologically, physiologically and biologically inferior tissues. The degree and the character of an incomplete cure depend on the residual rests of the products of the inflammation, which may have been alterative, or exudative and infiltrative, or proliferative.

The dominance and persistence of the alterative form of an infection means deranged function as the surface epithelium or parenchyma is altered in this process; the dominance and persistence of the exudative or infiltrative form means a stormy course of the infection frequently accompanied by abscess formation; while the dominance and persistence of the proliferative form will lead to a protracted, lingering course of the disease. The end-results therefore are either: (1) permanent changes in the specific functional tissue and cells; or (2) infiltrative and exudative processes; or (3) persistent inflammatory tumefactions. All three changes may be found combined in acute and chronic infections.

About 75 per cent of female pelvic infections are gonorrheal, about 20 per cent pyogenic or septic, and about 5 per cent tuberculous. Pelvic infections are self-limited. If treated conservatively about 65 per cent terminate in a complete cure with restitution of normal physiologic function and normal anatomic relations; about 20 per cent end in a subjective cure, the patient is free from symptoms though pathologic changes have been left behind as atresias of the tubes and pelvic adhesions. Sterility without palpatory findings is usually present in this group. The remaining 15 per cent constitute the chroni-

cally ill patients with permanent and palpable changes in the pelvic organs. Resort to radical surgical measures alone will restore such patients to health.

These observations permit the conclusion: (1) The gonorrheal infections are the preponderant cause of tubal obstruction with acquired primary or secondary sterility. (2) The alterative and exudative forms of inflammation, if becoming chronic, probably are followed by a subjective recovery but may leave inferiorly functioning tissues or tubal atresias behind; and (3) it is in these forms of tubal infections that sterility is found.

DIAGNOSIS OF STERILITY DUE TO TUBAL OBSTRUCTION

Tubal gas inflation, hysterosalpingography and pneumoperitoneum are the newer methods of laboratory diagnosis to aid in the corroboration of the clinical diagnosis.

Pneumoperitoneum, or the introduction of filtered air or gas into the abdominal cavity and subsequent inspection with the endoscope was done by Kelling in 1902. Jacobaeus in 1910, Orndoff in 1920, and Steiner in 1924 described similar procedures. Orndoff not only employed indirect vision but added radiography. The procedure has been termed celioscopy, laparoscopy, peritoneoscopy, and abdominoscopy.

Weber in 1913 inflated the abdominal cavity with oxygen and then made x-ray pictures. Goetze in 1918 applied the method to diseases of the pelvic organs in women with the patient in the knee-chest position. Steward and Stein in 1919 placed the patient in the Trendelenburg position, produced pneumoperitoneum and then took x-ray pictures of the pelvic organs diagnosing pelvic tumors, adnexal inflammatory tumefactions, changes in size, form and position of the uterus. Goetze, Peterson, Wintz, Stein and Arens among others made exhaustive studies of the diagnostic importance of pneumoperitoneum and roentgenography in diseases of women. The value of pneumoperitoneum with abdominoscopy and roentgenography is limited to the differential diagnosis of tumors, pregnancy, and inflammatory tumefactions.

Hysterosalpingography was introduced by Carey in 1914. He demonstrated the patency or occlusion of the uterine tubes through the transuterine injection of collargol and roentgenography. The method, however, did not come into general use until 1923 when Kennedy modified the procedure by the use of a 20 per cent aqueous solution of sodium iodide. Sicard and Forestier[23] introduced as an opaque medium a 40 per cent solution of iodine in oil of poppy, and Portret in 1923 applied this preparation in the diagnosis of gynecologic diseases especially as a complement to the Rubin test in the diagnosis of sterility. After an injection into a closed cavity the iodized oil is absorbed slowly. Even a period of two years or more may be required, but absorption is finally complete and abscess or a tumor never forms.

Hysterosalpingography enables one to visualize the site of obstruction in the tube, which may be in the intramural or isthmic portion or the abdominal ostium. It, also, may show deformities of the uterus, fundal polyps, etc. Kennedy found that about 30 per cent of obstructions were located in the isthmus. Aldridge in a series of sterility cases found that 66.5 per cent had partial or complete obstruction and in 44 per cent of these pelvic examination was negative.

Stein and Arens, Jung and Schirmer combine hysterosalpingography with pneumoperitoneography to enhance the diagnostic findings.

Transuterine gas inflation was introduced by Rubin in 1920. The method has been universally and rapidly accepted as a diagnostic procedure in gynecology. Innumerable modifications and refinements have been reported from time to time. They consist in the development of highly complicated apparatus to inflate the genital canal, the use of oxygen and carbon dioxide instead of air, and the addition of auscultation and roentgenographic methods to demonstrate the presence of air or gas in the abdominal cavity. Yet the simpler the technical procedure the more useful will be its diagnostic value. An example is the rubber bulb air inflation method of Heaney. Transuterine gas inflation will demonstrate the openness or occlusion of the uterine tubes. It may enable one by auscultation to state whether one tube is open and the other closed, but the method cannot fix the site of the obstruction or the presence of deformities in the genital canal.

The indications for these methods of diagnosis are:

1. Sterility in the female, if potency of the male partner has been assured, the patient is desirous of offspring, and palpatory changes in the adnexa are absent.

2. Transuterine tubal gas inflation is used to test patency or nonpatency of the tubes. Should the tubes be closed then hysterosalpingography enables one to locate the site of the obstruction.

3. Pneumoperitoneum should be confined to such cases where obscure pathology is found on palpation and an aid in differential diagnosis is necessary.

The use of the diagnostic measures is contraindicated:

1. In the presence of amenorrhea unless pregnancy can be absolutely excluded.

2. In the premenstrual phase of the endometrial cycle. The endometrium is then thickened and spongy and may temporarily clog the uterine tubal ostium, or endometrial particles may be forced into the peritoneal cavity where they might give rise to the formation of endometriosis. The diameter of the uterine tubes in the intramural portion is 0.8 to 1 mm. according to Zorn.

3. In uterine hemorrhages. Uterine contents as viable endometrial or cancerous débris may be forced into the pelvic cavity where they might give rise to implantation metastases, or air may enter the blood stream through the open blood vessels. Air accidentally entering the blood vessels may be dangerous causing air emboli. Oxygen and carbon dioxide are deemed harmless as they are rapidly absorbed.

4. In acute and subacute infections of the genital tract. Intrauterine instrumentation is always contraindicated in the presence of recent infections. Control of the infection may be determined by repeated local examinations and manipulations especially near the menstrual period, the leucocytic and the differential leucocytic count, and the erythrocyte sedimentation time.

5. Profuse leucorrhea in the presence of a cervicitis. The latter should be treated and cured before the diagnostic tests are performed. It, also, is a frequent cause of sterility. Their subsidence may obviate any other treatment.

6. Advanced organic diseases of the heart, lungs and kidneys. Pneumoperitoneum necessitates the use of comparatively large amounts of gas causing subsequent embarrassment of the heart and lungs. The small amount of gas or lipiodol (5 to 10 cm.) used in tubal inflation or hysterosalpingography are without any danger. The heart, kidney and lung diseases also may render pregnancy inadvisable.

7. Disturbances of metabolism as diabetes mellitus, dysfunction of ductless glands. Metabolic disturbances are often a cause of sterility due to ovarian dysfunction, while endocrine imbalance as evidenced by adiposity, infantile uterus may bar conception and therefore should be corrected first, before any further examinations or treatment are done.

The technic of tubal inflation and hysterosalpingography need not be discussed. It is of importance to note that the test should be performed during the second week of the ovarian cycle and that it should be repeated after an interval of a month if negative results were obtained. The x-ray picture should be taken ten to fifteen minutes after the injection of oil. Uterine and tubal spasms take place preventing the oil from immediately entering the tubes. When retraction occurs the tubes fill rapidly and the oil is spilled into the pelvic cavity.

SURGICAL TREATMENT

Stricture of atresia of the isthmic and intramural portion of the tube requires resection and reimplantation of the tube according to the technic advised by Strassmann. To determine the point of resection of the isthmic portion of the tube, the Curtis procedure of retrograde inflation of the tube through the abdominal ostium with a glass or rubber bulb syringe should be used. Closure of the abdominal ostium indicates salpingostomy as first advocated by A. Martin. Absence of both tubes or degeneration or disease requiring their removal may make the implantation of a healthy ovary attached to its normal blood and nerve supply into the uterine cavity advisable. Estes, Tuffier and others have written extensively on this subject.

Pregnancies with full-term labors after tubal implantations have been reported by Strassmann, Shaw, Nowak, Unterberger, and others. Watkins performed such an operation followed by a full-term pregnancy as early as 1899. The operation is also indicated after the removal of cornual adenomyomas, after intramural and isthmic pregnancies and after tubal sterilization operations. Success will be much better in these noninflammatory obstructions.

In 429 cases of salpingostomies collected from the literature 43 full-term pregnancies occurred, that is 10.03 per cent. Gellhorn states that

plastic operations on the tubes are justifiable in tubal occlusion from tubal pregnancy, chronic appendicitis, hydrosalpinx and hematosalpinx. The mucosa of the tube should be normal.

To maintain patency after salpingostomies and resections a twig of chromic catgut should be inserted through the abdominal ostium into the uterine cavity and tied to the ostium. Rubin and others advise repeated gas inflations at ten-day intervals following operation. We insert a twig and use hysterosalpingography monthly for this purpose.

Ovarian transplantations for the cure of sterility have raised more controversial discussions and claims in medical literature than the other operative procedures for sterility. Pregnancies after ovarian grafting or transplantation have been reported by Polk, Norris, Frank, Dudley, Stone, Bainbridge, Sippel, Tuffier, Estes, Gellert, and others. Sellheim places the number of full-term pregnancies after ovarian transplantation at about 10 per cent.

Estes performed within twenty years 45 operations and had 5 or 11.11 per cent full-term pregnancies. He amputates the uterine cornua slantingly until an opening to the uterine cavity is established. The defect is covered with the hemisected ovary left attached to its blood and nerve supply. Tuffier, Bell and Sellheim make an opening in the posterior uterine wall and then insert the whole ovary left attached to the uterine blood and nerve supply. Care must be had not to compress the pedicle when closing the uterine wall.

Tubal transplantations and salpingostomies have been done by us fifteen times. In two instances pregnancy followed afterward. One patient following an acute appendicitis had a right salpingectomy and a left salpingostomy and has had three full-term normal labors. Primary sterility had existed for four years. Ovarian implantation has been done once. The patient when fifteen years old had an operation for acute appendicitis. The appendix, the tubes, and the left ovary were removed. The earnest request of husband and wife induced us to perform the operation.

DISCUSSION

The treatment of sterility due to acquired atresia or aplasia caused chiefly by infections deserves our earnest attention. The desire of a barren wife mated to a potent husband to bear offspring and to submit to any measure to attain that end should be heeded. The newer diagnostic measures which have been discussed enable the gynecologist to visualize anatomic changes in the genital tract, and especially in the uterine tubes. It is possible, thereby, to determine the indicated method of surgical procedure. Exploratory laparotomies are certainly not any more justifiable. The success of surgical treatment probably depends on the presence of a normal tubal mucosa. The efficacy of the operation should be tested by repeated air inflations and hystero-

salpingographies. Thereby reocclusions, especially of the abdominal ostium may be forestalled. The transplantation of an ovary into the uterine cavity in the absence of both tubes has shown the same percentage of full-term pregnancies as salpingostomy. A careful follow-up of all cases is the only means to settle the value or uselessness of the plastic operations.

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(For discussion, see page 135.)

ON THE ORIGIN OF OVARIAN EPITHELIUM*

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THAT there is no true epithelium in the normal ovary is a fact familiar to those who have studied its histology. That true epithelium is found in pathologic ovaries is equally well known. Klebs, Waldeyer, Hoffstetter, Goodall, Nagel, Marchand, Pfannenstiel and

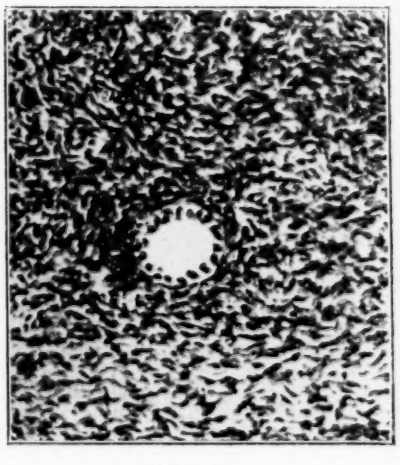

Fig. 1.

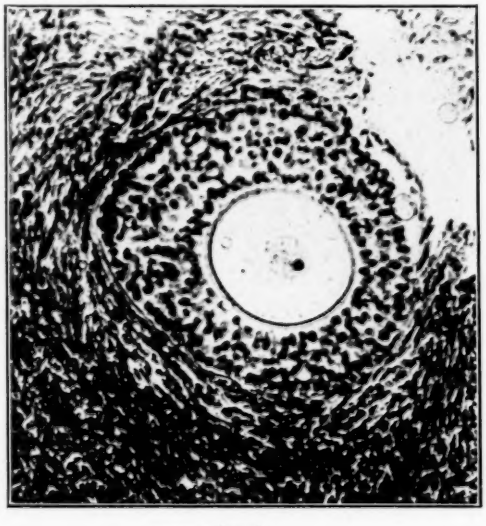

Fig. 2.

Fig. 1.—(18066) Showing a graafian follicle beginning to develop. The ovum is missing. The space is slightly enlarged. The cells have increased in number and become larger and are arranged in a single definite layer lining the space.

Fig. 2.—(3001-E) A graafian follicle well started on its growth. The space is very much enlarged. The ovum is many times larger than the entire undeveloped follicle and shows the nucleus and nucleolus. The granulosa cells have increased in number and fill up all the space except that occupied by the ovum. There are no appreciable changes in the stroma.

many others have presented extensive observations and many theories have been evolved but no agreement reached. Kaufmann says, "Pfannenstiel believes that the pseudomucinous cysts arise from follicle epithelium, but no one has as yet observed a transition of follicle epithelium into epithelial goblet cells as in glands." If the origin of the epithelium found in the pathologic ovaries can be traced, the explanation of the formation of multilocular cysts and all other abnormal epithelial growths of the ovary would be comparatively easy. The tracing of

*Read at a meeting of the Baltimore Obstetrical and Gynecological Society, January 9, 1931.

one source of this epithelium and the demonstration of the manner of its growth is the object of this study. So far as I have been able to learn, this is the first demonstration of the transition of graafian follicle cells into true epithelium.

The cortex of the ovary consists of a dense stroma of connective tissue in which are embedded the graafian follicles. The undeveloped

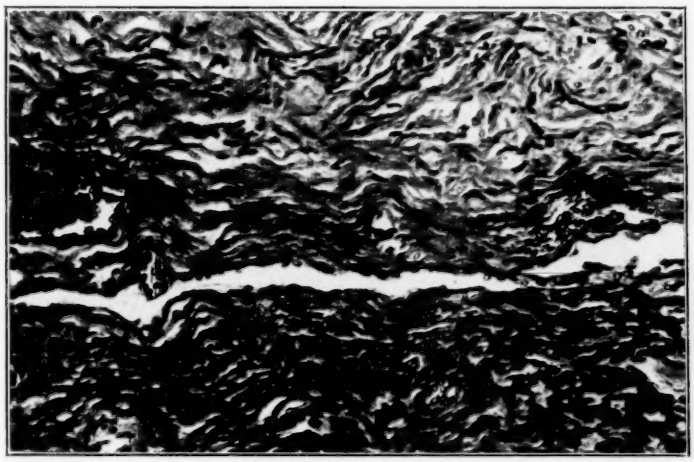

Fig. 3.—(18615-A) The cells of the corpus luteum have become definite connective tissue cells but have not undergone hyalinization. The line of cleavage between the connective tissue cells of the cortex and those derived from the granulosa cells shows conclusively that the connective tissue that replaces the corpus luteum is not derived from the cortex but is the result of the direct transition of lutein cells into connective tissue cells. If this were not the case there would be no clear line of cleavage but the two would be fused.

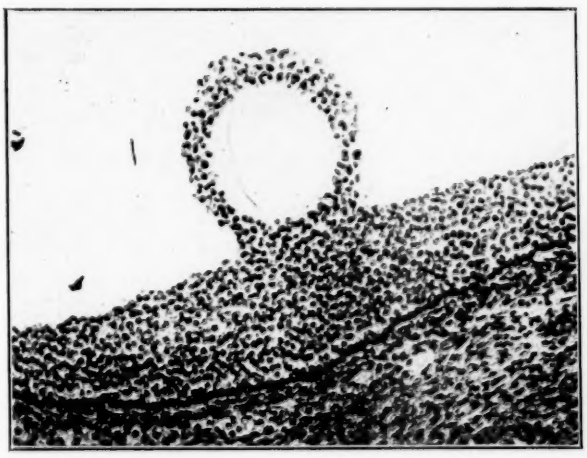

Fig. 4.—(6287-C) Degenerating ovum; waning discus proligerus; granulosa cells. The impulse which starts the graafian follicle to develop does not always continue and instead of a corpus luteum forming there is, as in this instance, a decrease in the size of the granulosa cells. They become spread out over the inner surface of the cavity and the discus proligerus becomes smaller. The fluid in the space gradually increases and the increased pressure tends to further thin out and decrease the size of the granulosa cells. In this way are formed the small graafian follicle or atretic cysts which are present in nearly all ovaries.

graafian follicle is a very simple structure, consisting of a small space lined by a single layer of cells and enclosing usually a single ovum. Only a very small percentage of the follicles present in an ovary ever develop. The vast majority disappear without leaving a trace. When a follicle receives the impulse that causes it to develop, there is at first an enlargement of the space which is completely filled by the lining cells, greatly increased both in size and number and by the ovum which also is increased in size. A little later a clear space is formed between the cells. As the fluid in the clear space increases a cavity is formed. The cavity in its entire extent is lined by numerous layers of unstratified, rounded cells; but on one side the cells are

Fig. 5.

Fig. 6.

Fig. 5.—(4509-D) The granulosa layer of a small cyst has been spread out over a considerable area, showing the easy detachment of the granulosa cells from the ovarian cortex.

Fig. 6.—(15687) In multilocular cysts, spaces are found which are lined by columnar epithelium. This epithelium is higher and more easily made out in the smaller spaces; because the tension in the smaller cavities is less and the epithelium has been subject to less internal pressure. This photomicrograph was made from a small multilocular cyst and illustrates the type of cells that secrete the mucilaginous content of the cysts.

heaped up around the ovum forming the discus proligerus. These cells are very clannish. They live very close to the cortex cells, but there is always a line of cleavage between them and the cortex cells so that they never intermingle. From these cells is formed the corpus luteum, which in the process of recession becomes first ordinary connective tissue and later the corpus albicans which is a connective tissue mass undergoing hyalinization.

In other words the cells lining the graafian follicle in the course of normal growth are converted into connective tissue cells. As the graafian follicle develops there are changes in the cortex of the ovary immediately surrounding the follicle. The connective tissue cells of the cortex become larger, rounded and vesicular. But there is never at any time an intermingling of the cortex cells with those originally within the graafian follicle. There is always a line of cleavage between these cortex cells and the cells originally lining the graafian follicle and all cells derived from them. The changes in the connective tissue cells of the cortex are somewhat analogous to the changes in the stroma cells in the endometrium during pregnancy or those seen in the connective tissue of the tube in an extrauterine pregnacy. These

Fig. 7.

Fig. 8.

Fig. 7.—(11207-B) Showing two cavities in one field, one lined by epithelium and the other by compressed granulosa cells. In another part of the latter cavity, the granulosa cells are more numerous then in the part shown.

Fig. 8.—(16162-B) This picture is taken through a lens of low magnifying power. It shows the whole of one small cavity with its continuous cell lining. The following three pictures show the various types of cells in this uninterrupted lining and the direct transition from granulosa cells to epithelial cells. This one space shows granulosa cells such as are found only in degenerating graafian follicles, and in tracing the unbroken lining of the cavity it is seen that there is a gradual transition from this type of cells to columnar epithelium. (*A*, *B*, and *C*, see also legends of Figs. 9, 10, and 11.)

modified tissue cells of the cortex are divided into two layers; the theca interna and the theca externa. The change in these cells is apparently solely a process of softening the firm connective tissue by which the graafian follicle is surrounded, in preparation for the rupture of the follicle and the freeing of the ovum. If the graafian follicle ceases to develop, as frequently happens, the cortex cells promptly return to their original state.

Many graafian follicles after they have begun to react to the impulse of development do not continue the course to completion as outlined above, but for some reason the process stops, the follicle becomes distended with fluid and a small cyst is formed. Occasionally in one of these cysts an ovum is found still surrounded by its shrinking discus proligerus. The remainder of the cyst is lined by the same type of cells found in the developing follicle, but they have decreased in size. The size of the cells and their number vary with the age of the cyst and the tension in it. In the more recently formed cysts the cells are very numerous and are heaped up in unstratified layers. In the older cysts they are thinned out sometimes to a single layer. Around these cysts both the theca interna and externa have receded and are not

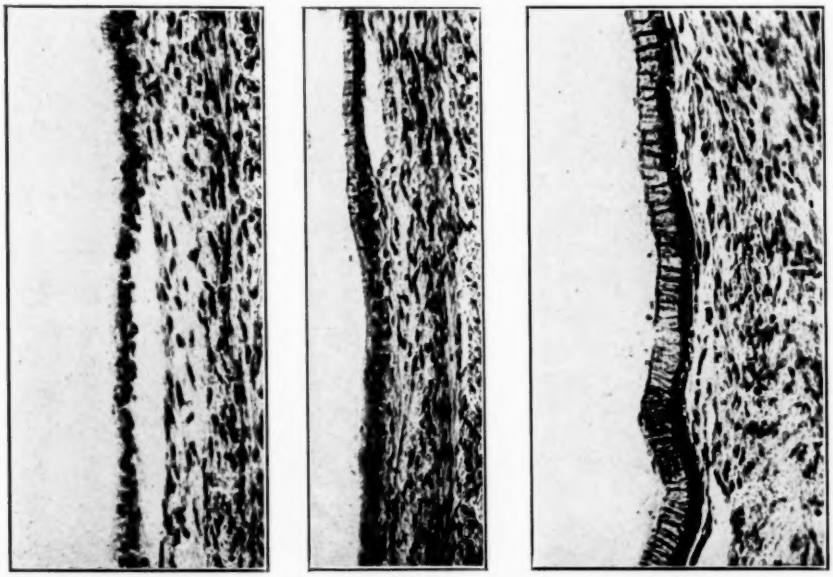

Fig. 9. Fig. 10. Fig. 11.

Figs. 9, 10, and 11.—Photomicrographs of the lining of this cavity taken at three different points.

Fig. 9.—At this point the lining is made up of unmistakable granulosa cells. (*A* in Fig. 8.)

Fig. 10.—Here the lining approaches the appearance of definite epithelium. (*B* in Fig. 8.)

Fig. 11.—Columnar epithelium. (*C* in Fig. 8.)

recognizable. The lining of these cysts lies loosely upon the cells of the cortex and is easily detached from them. Cysts of this type occur in practically all ovaries and are of very little clinical or pathologic significance.

The ovum and its surrounding cells in the follicle are of the same embryologic origin. No one speaks of the ovum as an epithelial cell, though it is common to call the other cells germinal epithelium. The ovum is only one of a group that develops differently from its associates. Under influences that we trace but do not understand, the fertilized ovum produces every type of cell in the body. Why then

cannot cells that have a common origin with it and are very closely related to it, most of the time, under what we recognize as normal conditions, develop into connective tissue cells and under other influences of which we know nothing, be converted into epithelial cells? That this conversion does take place can be demonstrated beyond a reason-

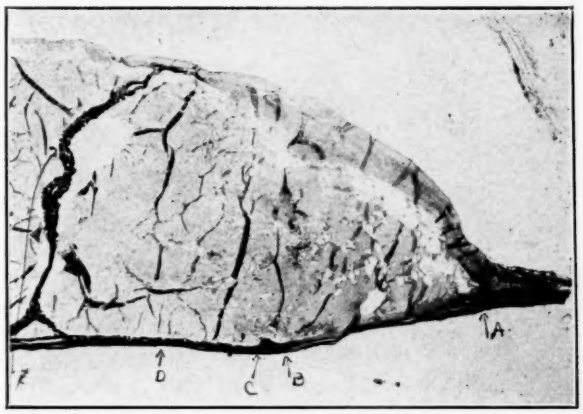

Fig. 12.—(18009-A) This slide carries the changes a little further than that shown in Fig. 8; for here are shown in one cavity, lutein cells, granulosa cells, the gradual transition from granulosa to epithelium and the fully developed epithelium.

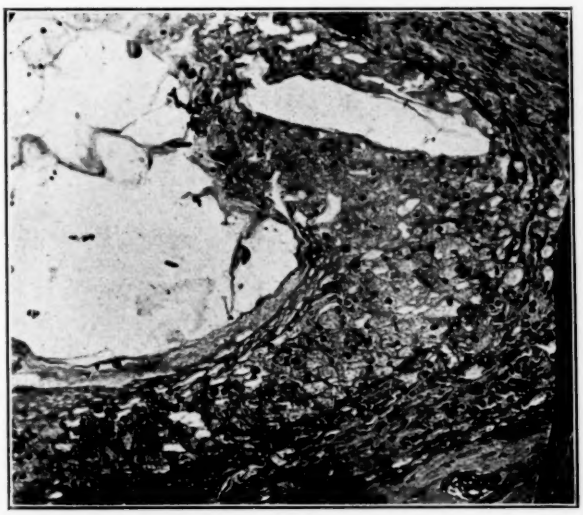

Fig. 13.—Showing lutein cells in the cavity and resting upon the ovarian cortex.

able doubt. For this reason the term germinal epithelium should be dropped and some name given to these cells, which is more in accord with their normal processes of development.

For the present the term granulosa cells is sufficiently noncommittal to be useful and will be applied to the cells of the graafian follicle when they are neither definitely connective tissue nor epithelium.

It has been thought to be unnecessary to reproduce pictures either of the normal undeveloped graafian follicle, the corpus luteum, or the corpus albicans. All are perfectly familiar to every one who has

Fig. 14.

Fig. 15.

Fig. 14.—The right side of the small mound is covered only with compressed granulosa cells with no indication of true epithelium.

Fig. 15.—Granulosa cells on the top of the mound and the gradual transition into epithelium to the left.

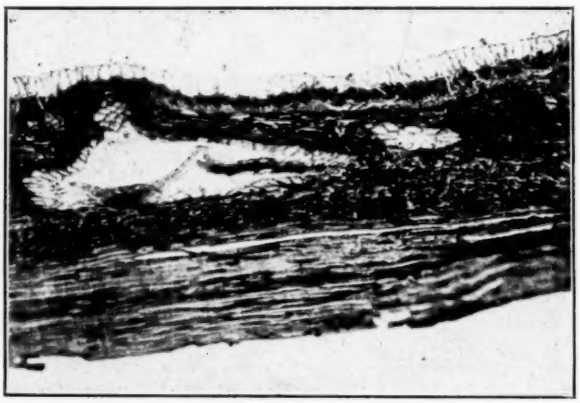

Fig. 16.—Showing completely developed epithelium of the type commonly found in multilocular cysts. Just beneath is the ovarian cortex.

paid any attention to the histology of the ovary; but a transition stage between the corpus luteum and the corpus albicans is shown. The illustrations of the normal development of the graafian follicle are inserted to clear up certain misconceptions in regard to this process

which are prevalent and which have added confusion to a simple, normal progression.

CONCLUSIONS

1. The cells surrounding the ovum in the graafian follicles are undifferentiated cells that are capable of developing in more than one way.
2. Under what may be called normal stimuli they develop into connective tissue.
3. Under other stimuli they develop into true epithelium.
4. The transition from normal cells into epithelial cells can be definitely traced.

1025 North Calvert Street.

(For discussion, see page 142.)

BREECH PRESENTATIONS, REPORT OF 170 CASES*

By Roy W. Mohler, M.D., Philadelphia

INFANT mortality is very high for babies presenting by the breech. Every group of obstetricians should know of the mortality in their service and try in every possible way to lower it. In order to accomplish this, they should analyze their series of cases and determine what has been accomplished or neglected, and then aim to carry out those procedures which have proved advantageous. It is with this idea in mind that this report is given.

At the Philadelphia Lying-In Hospital there have been 170 breech deliveries in the period extending from April 1, 1927, to October 31, 1930. No breech presentations which were delivered by cesarean section have been included.

At the Philadelphia Lying-In Hospital the following methods of delivery have been carried out over the period of time represented by this report. During this time there were 65 spontaneous breech deliveries, all were small babies or very rapid deliveries. There were 38 extractions, which means that the baby was guided through the pelvis and the normal mechanism of labor was facilitated. There were 40 extractions with the application of forceps to the after-coming head. There were 23 babies decomposed and extracted and forceps were applied to the after-coming head, and there were 4 in which the method of delivery was not stated.

The series of 170 cases which we are reporting is not large as compared with many that have been reported. The infant mortality of the various reports varies greatly depending upon the exclusion of the premature infants and macerated infants above a certain weight, de-

*From the Philadelphia Lying-In Hospital, Philadelphia, Pa.
Read before the Obstetrical Society of Philadelphia, March 5, 1931.

formed babies, etc. Until there is some standard method of classification adopted we cannot compare statistics well. I have, therefore, included all cases which presented by the breech and were delivered by vagina. The 170 patients which form the basis of this report were

TABLE I. OUTLINE OF CASES

		PER CENT	PRIMIPARAE	PER CENT	MULTIPARAE	PER CENT
No. of cases	170		62	36.4	108	63.6
No. of live babies	110	64.6	40	64.5	70	64.8
Gross mortality	60	35.4	22	35.6	38	35.2
Group 1—Babies under 3 pounds	33	19.3	12	19.3	21	19.3
Group 1—Macerated fetus weight not given	5		1	1.5	4	3.8
Group 1—Total No. of babies	38	22.3	13	20.9	25	23.1
Group 2—No. of babies dead which weighed over 3 pounds. Table II	9	5.3	5	8.0+	4	4.0

classified as 62 primiparae and 108 multiparae. There were 40 live healthy babies discharged from the hospital which were delivered of the primiparae and 70 live healthy babies discharged from the hospital which were delivered by multiparae. There were 60 babies delivered by the breech which were lost, this represents a gross mortality of 35.4 per cent. I have arranged these cases in three groups. In Group 1 there were 33 babies weighing three pounds or less and could not be expected to survive. There were 5 more which weighed over three pounds but were premature and macerated. This would indicate that breech pregnancy has a very great chance of ending prematurely. In clinic cases, patients are difficult to control, and it seems quite impossible to lower this mortality from prematurity. In

TABLE II

CASE	PARA	WEIGHT OF CHILD	FETUS	TIME OF DEATH	AUTOPSY
4560	i	7 pounds 4 ounces	Macerated	One week before birth	No
5150	i	4 pounds	Body torn from head	Before admission to hospital	No
2670	i	3 pounds 12 ounces	Born alive Cord about neck	Few hours after delivery	No
3812	i	5 pounds 4 ounces	No pulsation in cord	Before birth after labor began	No
18427	i	3 pounds 8 ounces	Macerated	Before labor	No
1477	iv	5 pounds 5 ounces	Hemorrhage of newborn Syphilis	Seventh day postpartum	Yes
1158	iv	Not given; six months	Small	After delivery	No
2908	ii	3 pounds 9 ounces	Premature	After delivery No injury	No
19618	ii	4 pounds 8 ounces	Macerated; premature separation of placenta	Seven days before delivery	

Group 2 there were 9 babies that weighed over three pounds which died or were stillborn, their cause of death is noted in Table II and was not due to any accident of delivery, which could have been controlled in the hospital.

In Group 3 there were 13 babies which we feel were lost because of birth trauma and I shall give briefly their history.

CASE 3966.—Primipara, aged sixteen, colored, diagnosis not made until in labor, frank breech, cervix fully dilated and effaced, descent to mid pelvis. No progress with labor, decomposition and extraction with forceps to after-coming head, weight of child 8 pounds 6 ounces. Pelvic measurements were normal, difficult extraction because of size of child's head, child lived ten minutes after delivery. Autopsy showed subdural hemorrhage and tentorial tear.

CASE 4692.—Primipara, aged thirty-one, membranes ruptured, contracted pelvis recognized under anesthesia, prolapsed cord, did not pulsate during pains. Weight of child 5 pounds 4 ounces, cervix dilated manually, breech decomposed and extracted with forceps to after-coming head. Autopsy showed no gross lesions, death possibly from asphyxia due to prolapsed cord.

CASE 4139.—Primipara, aged twenty-eight, foot presenting at vulva, hard labor pains, cervix fully dilated and effaced, difficulty with nuchal arms and extended head. Extraction with forceps to after-coming head, baby born alive, lived twenty-four hours, weighed 7 pounds 13½ ounces. Autopsy showed a subdural hemorrhage with clots.

CASE 3894.—Primipara, aged thirty-four, cervix completely dilated and effaced, no progress in second stage. Measurements were normal, easy extraction with forceps to after-coming head. Baby weighed 6 pounds ½ ounce. Born dead. Autopsy showed a fracture of the seventh cervical vertebra with spinal cord completely severed.

CASE 5193.—Para ii, aged twenty-eight. First labor was spontaneous and short, baby presented by vertex. Pelvic measurements were normal, cervix completely dilated and effaced, breech was decomposed and fetus extracted with forceps to after-coming head. Baby weighed 8 pounds 6 ounces and died twenty-four hours after delivery. Autopsy showed a bilateral tentorial tear.

CASE 6227.—Para vi, aged thirty-three. All previous labors spontaneous except one easy forceps, emergency case sent into hospital with breech impacted for twenty-four hours. Breech was decomposed, baby extracted with forceps to after-coming head. Baby weighed 8 pounds with large head, died fifteen minutes after delivery. No autopsy was done but history suggested intracranial injury.

CASE 1658.—Para iv, aged twenty-seven. All previous labors were spontaneous. Breech was decomposed and extracted after full dilatation, and effacement of cervix. Baby weighed 8 pounds 6 ounces, died during labor. Autopsy was not performed but history suggested asphyxia or fracture of the skull.

CASE 3341.—Para v, aged twenty-six. Emergency case. Babies were lost in two previous labors. Breech had been impacted for forty-eight hours, large post-mature baby which weighed over 8 pounds. Baby was decomposed and extracted, craniotomy performed to remove after-coming head. Uterus was ruptured and hysterectomy was performed soon after delivery. Patient recovered from the delivery and operation and died on the thirteenth day after operation of a hemorrhage from bowel, the source of which could not be determined by autopsy. This is the only maternal death of the series.

CASE 3423.—Para iv, aged twenty-eight, colored, one living child, two dead children, none stillborn, previous labors were spontaneous with vertex presenting. Long first stage of labor, cervix fully dilated and effaced, no progress in second stage of labor. Decomposition of breech and extraction of 6 pound fetus, both arms became nuchal, head extracted with forceps. Autopsy of fetus showed a fracture of fifth and sixth cervical vertebrae, compression of cord and subdural hemorrhage caused by laceration of dura covering the coronal suture. The patient had a contracted pelvis which was recognized in pregnancy but because of other spontaneous labors was not considered seriously as a cause for dystocia.

CASE 811.—M., para vi, breech extraction of baby weighing 9 pounds, no difficulty in operation. Baby died on fifth day of intracranial hemorrhage.

CASE 2604.—Para ii, aged thirty. First labor was spontaneous easy vertex. Admitted to hospital without prenatal care. Diagnosis made in labor, cervix was not completely dilated or effaced. Had been in labor six hours. Breech decomposed and extracted after-coming head, delivered with forceps. Baby weighed 6 pounds 1 ounce. Autopsy showed a tentorial tear. This patient was delivered by house officer, and it seems from history that better results could have been secured by waiting until the first stage of labor was completed.

CASE 4796.—Para iii, aged twenty-nine. Two previous spontaneous labors at home. Patient had a large pelvis. Left foot of baby was presenting; cervix fully dilated and effaced after ten hours' labor. Easy extraction without traction. Head was delivered easily without forceps. Baby weighed 12 pounds. Baby died soon after birth. Autopsy showed a complete tentorial tear.

MCKEE CASE 5004.—Para ii, aged thirty. Previous labor was normal, forceps had been applied to vertex when head was on perineum. Pelvic measurements were normal. Long first stage labor, no progress in second stage after complete dilatation and effacement of cervix. Breech was decomposed and a 7 pound 3 ounce baby extracted. Cord was edematous, no pulsation noted during labor. Baby was dead at birth. Cause of death was pressure on cord during second stage of labor. No autopsy.

It is the analysis of the accidents occurring in Group 3 whose histories I have just reviewed from which we wish to draw our conclusions. These deaths represent about a 10 per cent fetal mortality or 13 of the 123 viable babies or 13 babies from 170 breech pregnancies were lost from some accident of delivery. Eleven of these received intracranial injuries sufficient to prove fatal. Three of these were delivered of primiparae and 8 of multiparae. Eight of the 11 babies dead of cranial injury weighed approximately 8 pounds or over. The other two deaths were due to prolapsed cords, one was a primipara whose baby weighed 5 pounds 14 ounces, the other a multipara whose baby weighed 7 pounds 3 ounces. It is generally agreed that prolapsed cord is a frequent cause of death in babies presenting by the breech. A certain number of such cases can be controlled by carefully watching the patient throughout labor. We do not feel that these accidents require any apology or explanation. The incidence of deaths from this cause would have been about the same in cases presenting by the vertex.

TABLE III

		PER CENT	PRIMIPARAE	PER CENT	MULTIPARAE	PER CENT
No. of cases in groups 1 and 2 as shown in Table I	47	27.6	18	28.9	29	27.1
No. of babies in Group 3 dead during labor or later	13	7.9 of 170 cases 10.5 of 123 cases	4	6.4 of 62 cases or 10% of 44 cases	9	8.3 of 108 cases 11% of 79 cases
Babies dead of cranial injuries	11	6.5 of 170 cases 9% of 123 cases	3	4.8 of 62 cases, 6.8 of 44 cases	8	
Babies dead of prolapsed cord	2		1		1	
Babies over 8 pounds; whole series	26	15.3	3	4.8	23	21.0+
Babies over 8 pounds lost in labor	7+		1+	33.0	6	25.0–

In the whole series of the 170 patients there were 23 multiparae and 4 primiparae who delivered babies weighing about 8 pounds or over. This confirms the impression that usually multiparae deliver larger babies than primiparae. Six of the 23 multiparae and 2 of the 4 primiparae with babies weighing near 8 pounds or over lost their babies because of intracranial injuries directly due to delivery. This represents a mortality of approximately 30 per cent which is three times greater than the mortality of all viable babies in the entire series. If a deduction can be drawn from this small number of cases, we may say that a baby weighing 8 pounds or over has only a 70 per cent chance of being born alive if presenting by breech, and delivered vaginally.

How shall these cases be managed? The man who has had a large experience in the management of breech presentations could have managed successfully the vaginal delivery of some of these cases; in a large hospital service there are times when the breech will not have been recognized during pregnancy, the resident staff or a man with limited experience in handling breech labors will at times be forced to manage them. It would seem that recognition of the breech is imperative, in all doubtful cases x-ray should be used for diagnosis. The size of the child should be determined, it is usually possible to judge fairly accurately as to whether it is large or not. If in doubt the method of Thoms, which adapts the perforated lead plate to a plane which corresponds to the plane of the inlet of the pelvis may be adopted. If the baby is then considered large, the expediency of doing a cesarean section must be considered.

There are some who believe that all primiparae thirty-five years of age or older should be delivered of a breech by a cesarean section. Instead of this dictum we should accept the one that all breech babies which weigh over 8 pounds should be delivered by cesarean section, if the assurance of a living child warrants the additional risk to the mother. It should always be planned to do an elective section when possible. This dictum should be accepted only by trained obstetricians.

In drawing conclusions from this series of cases, we should first recommend that all cases of breech presentation should be studied very carefully during the prenatal period. Each obstetrician should aim to be present at as many breech deliveries as possible so as to constantly keep himself in practice by managing breech labors frequently. Finally the size of the child should be considered more in the management of the breech presentation, than the age and parity of the patient.

HYSTEROTOMY AND STERILIZATION

By A. M. Mendenhall, M.D., Indianapolis, Ind.

IT IS interesting to note the paucity of literature on thes esubjects and equally interesting to speculate on the possible reasons. Even though hysterotomy, reserving this term to mean opening the uterine fundus prior to viability of the child, has been mentioned and done for many years, yet very few writers have published articles which definitely discuss the subject.

In 1912 Deaver[1] published an article on hysterotomy in which he presented strong arguments for its more frequent use. However he advocated it in some cases so contrary to the established ideas of obstetric surgery that his paper received very unfair criticism and failed to receive proper consideration. Nevertheless he then recommended this operation in certain cases which are today handled by progressive obstetricians the world over exactly as he suggested.

In 1928 Williams[2] published an article on sterilization in which he discussed the indications in a rather larger group than had heretofore been considered, including "social conditions."

For the operation of therapeutic abortion there seems to be little argument left in favor of the cervical route. In uncontaminated cases a properly performed hysterotomy should carry no more hazards than cervical dilatation and curettage. It required a general surgeon[1] to call our attention nearly two decades ago to the "unsurgical" manner in which we were doing our therapeutic abortions.

It matters not whether an abortion by way of the cervix is to be done in a one- or two-stage procedure, it requires an anesthetic and cervical dilatation. Cervical dilatation carries with it the danger of considerable trauma and shock. No matter what the instrument used inside the uterus, there is the danger of perforation and the operator is never quite certain that all the products of conception have been removed. To aid the complete emptying of the uterus and to control hemorrhage he usually packs. The packing is later removed and it is merely hoped the uterus is empty.

Considerable blood loss often occurs at the so-called one-stage operation, and then the patient continues to bleed for many days or weeks or until another curettage is needed to remove the tissue missed at the first operation.

All of this is done through one of the most constantly infected areas of the body and one is never quite secure as to whether the patient is infected until several days following this "unsurgical" procedure. And finally this operation offers no opportunity to sterilize.

On the other hand in preparation for hysterotomy one can much more positively disinfect the skin of the abdomen than the vaginal field. Opening the uterine fundus early in pregnancy incurs but a very slight blood loss and a few sutures close the uterine wound securely. The uterine contents are removed by sight, leaving no doubt as to whether there is any tissue left behind. The curette is not necessary. The gloved finger, possibly covered with sterile gauze, is the only instrument needed inside the uterus at this operation. The cervical canal is not and should not be disturbed and infection is reduced practically to zero. A later operation will not be necessary and recovery is prompt. Fundamental principles of antisepsis, conservation of blood, complete operation by sight are all enhanced by hysterotomy as against the vaginal route for therapeutic abortion.

Furthermore a very high percentage of patients needing therapeutic abortion also need sterilization rather than repeated therapeutic abortions and the abdominal route offers opportunity to sterilize.

An outstanding contraindication of course to this operation would be a suspicion that the contents of the uterus are already infected. In this we cannot support Deaver's recommendation to remove secundines or placental tissue by hysterotomy. The danger of infection is too great and all such cases, possibly excepting some cases of placenta accreta, should be operated by way of the vagina.

In discussing sterilization in this paper it is to be understood that we are discussing it as a definite operation in itself and not as an operation rendered unavoidable in connection with other pelvic surgery. Volumes have been written in recent years on birth control and eugenics and much more will have been written before these questions are completely settled, nevertheless as medical men, we are continually confronted with the need for their solution.

Medical men are applying themselves more and more to preventive measures. Is not birth control in many instances a form of preventive medicine? Is not the prevention of pregnancy in an advanced cardiac, nephritic, or tuberculous patient a form of prophylaxis? To do a therapeutic abortion on these cases and still leave them in a condition where pregnancy, defined many years ago by Mauriceau as "a disease of nine months' standing," may recur, is certainly out of harmony with this day and age. Birth control propagandists and contraception advocates to the contrary notwithstanding there is no method yet known which is sufficiently dependable to be relied upon in cases where pregnancy is a serious menace. The only procedure which can be depended upon other than sterilization, is sexual continence and it is folly to expect this in the average married couple. Furthermore if followed over long periods of time, it is not without risk to physical and mental well-being.

There remains some difference of opinion among obstetricians as to methods of sterilization. The procedure considered most dependable and followed by most operators is that of excision of the isthmial portion of each tube and closure of the wound in the uterine cornua. This, if done carefully, should greatly reduce the dangers of subsequent pregnancies. In so far as I have been able to follow up my own cases no pregnancies have occurred and many other operators have had no failures.

Following is a list of cases selected from my records to illustrate several conditions for which sterilizations and hysterotomies have been done. It will be noted that in every case where a hysterotomy was indicated, I believed it also necessary to sterilize, though it is admitted there may be a rare case where a hysterotomy might be indicated and yet give the patient a chance to recover from the illness and later become pregnant.

MENTAL

B. (No. 3054), para i, aged twenty-one. Feeble-minded congenital moron, never passing first grade in school. A state charge. Hysterotomy and sterilization.

S. (No. 1376), para iii. Rheumatic heart since a child, double mitral and broken compensation. Recent embolism, catatonia. One living child; one born alive but soon died of congenital anomalies. Cesarean section and sterilization.

C. (No. 21, 820), para i, aged fifteen. Imbecile, high grade moron. Sydenham's chorea. Syphilis and gonorrhea. A state charge, Hysterotomy and sterilization.

S. (No. 5551), para v, aged thirty. Feeble-minded; husband insane maniac. Two children idiots and two children feeble-minded. Cesarean section and sterilization.

D. (No. 2925), para i, aged twenty-five. Epilepsy since a child, worse since pregnancy. Father died in insane hospital. Albuminuria. Cesarean section and sterilization.

S. (No. 3054), para i, aged eighteen. Imbecile, Court recommends sterilization. Cesarean section and sterilization.

F. (No. 6376). Confined in insane hospital. Husband epileptic. Fifteen pregnancies in sixteen years. Sterilization in puerperium.

G. (No. 3081), para v, aged twenty-nine. Chorea and psychoneurosis. Almost complete deafness. Four-plus Wassermann. Bad family history. Unable to take care of herself. Four living children. Hysterotomy and sterilization.

DISPROPORTION

C. (No. 2226), para ii, aged twenty-eight. Chronic pyelitis, tachycardia, justo minor pelvis, former section. Cesarean section and sterilization.

B. (No. 5542), para v, aged twenty-five. Almost totally deaf. One forceps delivery, baby died; one version delivery, baby died; one induced premature labor, baby died; one low-flap cesarean section, baby lived. Justo minor pelvis. Cesarean section and sterilization.

R. (No. 1666), para ii, aged twenty-eight. Former cesarean section for marked polyhydramnios and small pelvis. Pregnant with twins, excessive polyhydramnios, complaint for several days of pain over old scar in uterus. Cesarean section and sterilization three weeks before term.

Z. (No. 2199), para ix, aged thirty-one. Eight full-term babies, only two survived. Others lost at deliveries by forceps, craniotomies, early induction, etc.

Unilaterally contracted pelvis due to short leg since ankylosis of knee in infancy. Vesicovaginal fistula seven years. Cesarean section and sterilization.

TOXEMIA

C. (No. 5486), para vi, aged twenty-eight. Four living children. History of toxemia in every pregnancy. Eclampsia in two labors. Blood pressure 170/110, 4+ albuminuria, not relieved by treatment. Cesarean section and sterilization.

T. (No. 2333), para vii, aged thirty-three. First pregnancy, miscarriage at six months; second pregnancy, miscarriage at three months; third pregnancy, born at eight months; fourth pregnancy, living; fifth pregnancy, induction at eight months, baby died; sixth pregnancy, induction at seven months, baby died. Toxemia in all pregnancies. Hysterotomy and sterilization.

M. (No. 4317), para v, aged forty. Headache, edema, 4+ albumin, casts, nausea, epigastric pain, nervous, defective vision. Symptoms improved temporarily under treatment, then grew worse in spite of treatment. Blood pressure 220/120. Cesarean section and sterilization.

F. (No. 5579), para iii, aged thirty-five. Serious toxemia, blood pressure 202/120. Similar symptoms in last pregnancy. Cesarean section and sterilization.

NEPHRITIS AND TOXEMIA

G. (No. 5631), para vii, aged thirty-six. Six living children. Former severe toxemia. Now nephritic toxemia not relieved by treatment. Cesarean section and sterilization.

S. (No. 1960), para i, aged twenty-four. Nephritis for several years. Eclampsia, 4 convulsions. Hysterotomy and sterilization.

H. (No. 3702), para viii, aged thirty-five. Former nephritic toxemia. Seven living children. Acute nephritis at fourth month for which treatment failed. Hysterotomy and sterilization.

NEPHRECTOMY AND NEPHRITIS

C. (No. 5561), para v, aged thirty-seven. Three living children. One kidney out and the other infected. Phenolsulphonephthalein test 35. Albumin and pus in urine, specific gravity 1002. Toxic symptoms. Hysterotomy and sterilization.

C. (No. 20290), para ii, aged twenty-four. Former nephrectomy. Former cesarean section for toxemia and long labor. One living child. Albuminuria, elevated blood pressure. Cesarean section and sterilization.

TUBERCULOSIS

L. (No. 3935), para viii, aged thirty-five. Seven living children. Active tuberculosis clinically and by laboratory and x-ray diagnosis. Hysterotomy and sterilization.

S. (No. 7107), para iii, aged twenty-six. Three months' pregnancy. Two living children, active tuberculosis for eighteen months growing rapidly worse since pregnancy. Hysterotomy and sterilization. Spinal anesthesia.

R. (No. 3151), para iv, aged thirty-one. Tuberculosis before marriage. Three living children. Each pregnancy including the fourth and last was accompanied by severe nausea and vomiting and loss of weight and exacerbation of pulmonary lesions. Hysterotomy and sterilization.

CARDIAC

B. (No. 24509), para vi, aged thirty-one. Mitral stenosis, hypertension, not improved by treatment. Hysterotomy and sterilization.

F. (No. 4591), para vii, aged thirty-five. Five living children. Double mitral lesion, broken compensation. Last two pregnancies developed broken compensation. Elective section and sterilization.

B. (No. 54), para vi. Double mitral broken compensation at fifth month. Treatment failed. Hysterotomy and sterilization.

POSTENCEPHALITIS

F. (No. 18), para i, aged nineteen. Severe postencephalitic syndrome not relieved by treatment. Hysterotomy and sterilization.

B. (No. 4120), para iii, aged twenty-four. Postencephalitic syndrome and paralysis. One miscarriage at three months, one miscarriage at two months. Hysterotomy and sterilization.

MISCELLANEOUS

W. (No. 3011), para vi, aged thirty-five. Four children living. Albuminuria. Operated two years ago for spinal tumor leaving both legs in spastic contracture. Subsequent attempts of surgery failed to relieve contracture. Thighs flexed firmly on abdomen; and calves flexed firmly on thighs. Could not stand or walk. Could not sit except with feet supported on high stool. Cesarean section and sterilization.

S. (No. 3338), para ii, aged twenty-eight. Former cesarean section followed by large keloid of abdominal wall. Keloid later resected and recurred. Cesarean section and sterilization.

A. (No. 3932), para v, aged thirty-two. Last labor, face presentation, ruptured uterus and vaginal vault, delivery completed below and rupture packed. No repair done. Much discomfort and uterine pain after seventh month in this pregnancy. Cesarean section and sterilization.

H. (No. 5819), para iv, aged twenty-six. First pregnancy, hydatid mole; second pregnancy, pernicious vomiting, twins; third pregnancy pernicious vomiting, mental breakdown. Therapeutic abortion seriously advised by psychiatrist, carried through later, trachelorrhaphy, sterilization, appendectomy, plication of round ligaments.

V. (No. 5966), para iii, aged twenty-eight. First pregnancy, general poor health and confined to bed much of time. Never robust as a girl. Second pregnancy, miscarriage second month. Third pregnancy, much general debility, serious nausea and vomiting. Trachelorrhaphy, Gilliam suspension and sterilization.

B. (No. 6982), para iv, aged twenty-nine. Four full-term labors in five years; badly lacerated cervix, retroversion, general ill health. Economically in bad condition. Trachelorrhaphy, plication of round ligaments, sterilization.

W. (No. 6637), aged twenty-one. Congenital cataract. Two children congenital cataracts. Husband also blind. Sterilization in puerperium.

M. (No. 6724), para iv, aged thirty. First baby weighed 8½ pounds, spontaneous delivery. Second baby weighed 9½ pounds, spontaneous delivery. Third after long labor, cesarean section, 12-pound baby. Now pregnant at term. Cesarean and sterilization.

There were no deaths except one encephalitis syndrome patient who was considered practically moribund before operation, died of exhaustion and myocardial failure.

As to sterilization in toxemia of pregnancy, much individualization is necessary. In the recurrent type of toxemia with definite renal involvement, there is little doubt as to the indications to sterilize. Certain other types of toxemia may recover sufficiently to be allowed to risk subsequent pregnancy.

In a definitely established nephritis one may be quite sure that subsequent pregnancy is too dangerous to be risked and sterilization is strongly indicated.

As to the rule to follow in sterilizing cases of contracted pelves, there remains much difference of opinion. Few authorities are willing to sterilize in this condition at the first section, some believe that a second or third section is all any woman should be compelled to undergo. Most obstetricians are now sterilizing at the third or fourth section depending somewhat upon whether the former children are living. There can of course be no justification in hysterotomy prior to viability of the child where the only indication is contracted pelvis.

In cardiac cases it is very difficult if not quite impossible to formulate rules regarding sterilization. Each case must be studied thoroughly by a competent cardiologist, the type of lesion determined and the degree of decompensation carefully analyzed before a decision can be properly reached.

Encephalitis syndrome, chorea, epilepsy and other conditions mentioned in these case histories require special study in each case.

As to sociologic and economic reasons for sterilization or hysterotomy one is much handicapped by public opinion. Schumann[3] states that 80 to 85 per cent of all criminal abortions are among married women and suggests that some satisfactory method of birth control might markedly reduce the number of illegal abortions.

Rongy[4] believes we are not giving sufficient attention to the fact that many married women who already have large families, are living in a constant dread and fear of pregnancy with a result that they sometimes develop altered psychic reactions toward their husbands and children.

The physician has not the single duty of administering to present ills, but the far-reaching duty of adding to the full extent of his ability to the patient's future health and happiness and also to the health and happiness of other members of the family.

With a careful and conscientious selection of his patients, the obstetrician of today is in a position to do many more hysterotomies and sterilizations than have been done in the past.

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POSTPARTUM PARTIAL ANURIA WITH UREMIA AND FATAL UPPER ABDOMINAL HEMORRHAGE; REPORT OF A CASE WITH AUTOPSY FINDINGS

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THE patient, Mrs. C. S., para viii, aged thirty-eight, was admitted to the University Hospital, Sept. 14, 1930, eight and one-half months advanced in her eighth pregnancy, complaining of painless vaginal bleeding. Her out-patient prenatal record was distinctly normal. Past history was unimportant and previous pregnancies uncomplicated.

Vaginal examination revealed a placenta previa lateralis, the cervix being dilated about one and one-half fingers. Good pains were beginning. Presentation was

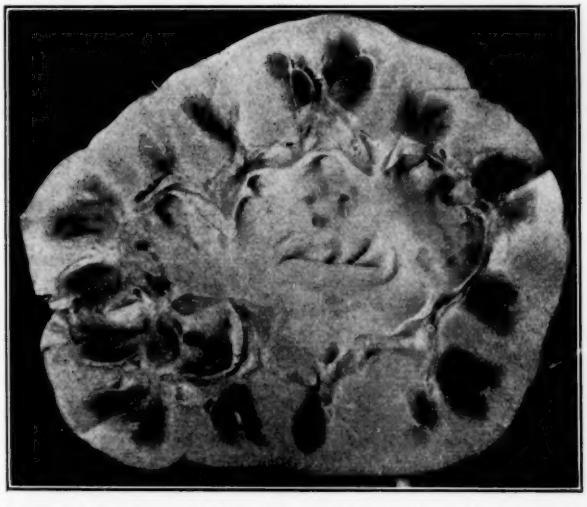

Fig. 1.—Kidney of the large, white, pale variety with cortex and pelves normal.

L.O.A. General physical examination was negative. Blood pressure 130/70; uranalysis normal; hemoglobin 65 per cent; R.B.C. 3.7; Wassermann negative.

A spontaneous labor of about two hours resulted in normal delivery of healthy female baby. Total blood loss was estimated at 400 c.c. An indirect blood transfusion of 750 c.c. from an ideal donor was given immediately postpartum. Five hours later patient showed signs of moderate obstetric shock. The blood pressure, uranalyses, blood urea, blood creatinine, fluid intake, and urinary output are graphically represented in Fig. 3.

First Day: General condition was quite satisfactory except for blood pressure, 100/50, for which 700 c.c. of citrated blood from an ideal donor was given. A very slight jaundice was observed.

Second Day: The jaundice was marked. Marked decrease in urinary output occurred. Uranalysis was strongly positive for bile. Icteric index 42; van den Bergh, direct and indirect, strongly positive; hemoglobin 70 per cent; R.B.C. 4.0.

Third Day: Jaundice was less. Slight pitting edema of ankles and about the sacrum appeared. Respiration was depressed and slowed. Increasing urinary suppression was manifested. W.B.C. were 22,000.

Fourth Day: Condition was not improved, except for decrease of jaundice. There was mental sluggishness. Edema had not increased. Cystoscopic examination with ureteral catheterization revealed bilateral anuria.

Fifth Day: Patient showed poor orientation with sluggish responses. Clinical jaundice was not apparent. Blood cholesterol 121 mg.; blood nonprotein nitrogen 129 mg.; blood uric acid 21 mg.; blood diazo reaction, negative; icteric index 21; plasma CO_2 37 vol. per cent; hemoglobin 45 per cent; R.B.C. 3.25; W.B.C. 11,000; fragility test normal.

Sixth Day: Patient's mental picture had improved. Slight vomiting occurred during the morning. Respiration was of Kussmaul type. Eye grounds were normal. Patient voided frequently in small amounts. Blood sugar 67 mg.; plasma CO_2 30 vol. per cent.; blood calcium time 1¾ min.; bleeding time 6 min.; clotting time 2½ min.

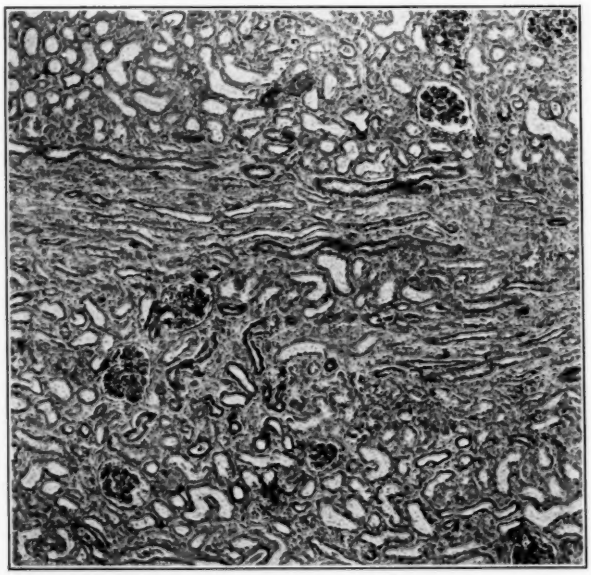

Fig. 2.—Microphotograph of kidney, showing marked tubular degeneration, a moderate increase in fibrous elements, and fatty degeneration of several of the glomeruli. Some of the tubules are filled with blood.

Seventh Day: Patient became drowsy and difficult to arouse in afternoon with recurrence of Kussmaul respiration. Edema was moderately increased. Blood sugar 83 mg.; CO_2 plasma 30 vol. per cent; blood indican 3½ mg.; blood chlorides 380 mg.; methemoglobin (spectroscopic test) negative; sedimentation velocity normal.

Eighth Day: Patient was still irrational. There was demonstrable ascites with marked puffiness of face and beginning hiccoughs. Anuria for over twelve hours was followed by output of 700 c.c. during remainder of the day. Blood sugar 72 mg.; plasma CO_2 29 vol. per cent; hemoglobin 45 per cent; R.B.C. 3,250,000; W.B.C. 32,000; urine urea 1.008 gm.; urine ammonia 1.239 gm.

Ninth Day: Marked coma of acidosis developed in early morning with respiration of six per minute and CO_2 plasma 29 vol. per cent. Five hundred c.c. of 5 per cent sodium bicarbonate given intravenously, during the administration of which there was a slight generalized clonic convulsion. Condition soon improved. Temper-

ature, elevated for the first time, reached a maximum of 101°. Hemoglobin 45 per cent; R.B.C. 2.5; W.B.C. 28,000; blood sugar 91 mg.; CO_2 plasma 47 vol. per cent; urine urea 6.73 gm.; urine ammonia 4.6 gm.

Tenth Day: Condition was definitely improved with return of mental alertness. Temperature 100.2°. Edema had decreased slightly. Blood sugar 111 mg.; CO_2 plasma 40 vol. per cent; urine urea 9.85 gm.; urine ammonia 1.51 gm.; blood diazo negative.

Eleventh Day: Further improvement was apparent. There were delusions of persecution and disorientation. Temperature 100.4°; blood sugar 110 mg.; CO_2 plasma 39 vol. per cent; urine urea 10.3 gm.; urine ammonia 1.18 gm.

Twelfth Day: General condition apparently unchanged, except that there was a complaint of lower abdominal cramps. Urinary output was showing gradual

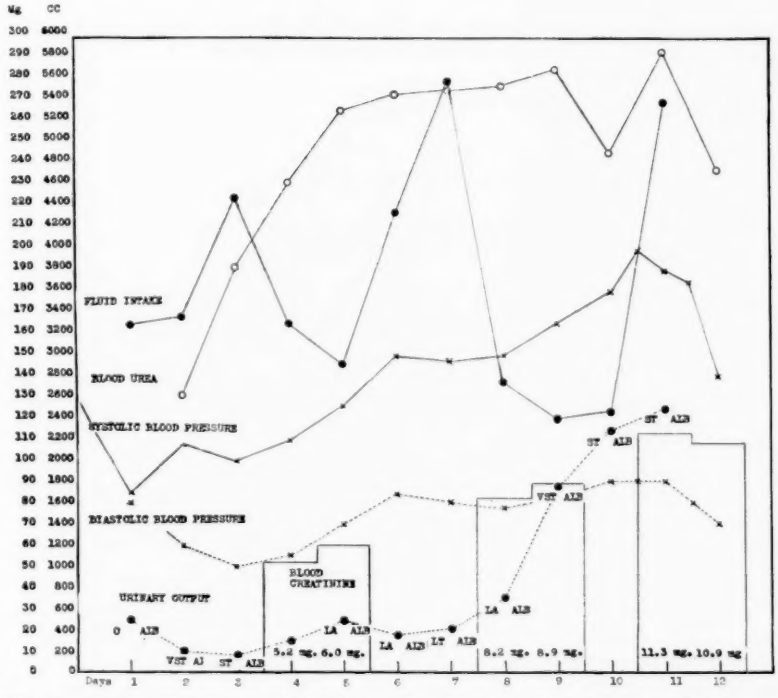

Fig. 3.—Chart showing fluid intake and urinary output in c.c.; blood urea and blood creatinine in mg. per 100 c.c.; and systolic and diastolic blood pressure. Albuminuria is indicated on the urinary graph as "VST alb," "LA alb," etc.

increase. At 10 A.M. patient suddenly became unconscious and exhibited marked pallor and cyanosis, pulse of very poor quality, respiration slow and difficult. Stimulation was administered without success and death from simultaneous respiratory and cardiac failure occurred in twenty minutes. Laboratory findings (taken one hour before death): blood urea 238 mg.; blood sugar 116 mg.; CO_2 plasma 43 vol. per cent; icteric index 6.4; blood creatinine 10.9 mg.

Treatment was supportive and symptomatic and included: Karrell diet for first three days with additional fluids to approximately 4500 c.c. Fruit juices were substituted for the milk after the third day. Intravenous hypertonic glucose was given once or twice daily. Hot stupes to kidney region and hot high colonic irrigations were administered. Renal decapsulation was advised against by the urologic consultants. No diuretics, except hypertonic glucose and twenty grains of theocin.

Autopsy Findings: The abdominal cavity contained about 2000 c.c. of blood-tinged fluid. Peritoneum was normal. Blood and clots, estimated to be 1000 c.c., were found in the upper abdomen, about the greater curvature of the stomach, medial surface of the spleen, surrounding the upper portion of the pancreas and in the lesser omental cavity. No site of hemorrhage could be located.

Liver: Surface was pale. Microscopic sections showed granular and fatty degeneration, most marked about the central veins. Liver cords in some fields were atrophic and cells showed unusually large nuclei. *Parenchymatous degeneration of liver.*

Kidneys: Tissue was pale, white, and with cortex and pelves normal. There were several areas of hemorrhage into the lining membrane. Microscopic studies showed very marked tubular degeneration, a moderate increase in new fibrous tissue stroma of marked edematous character, and a fatty degeneration of the glomeruli. A number of tubules were filled with blood. *Subacute and chronic diffuse nephritis.* (See gross and microphotographs.)

Uterus: Subinvolution with site of attachment of placenta previa lateralis.

Chemical examination: Examination of the organs revealed absence of heavy metals.

COMMENTS

This case presented interesting problems from several angles. (1) The prenatal records showed no evidence of demonstrable renal impairment. (2) The two large blood transfusions which the patient received were indicated by the secondary anemia and obstetric shock. (3) The jaundice was probably related to the transfusions as it was apparently hemolytic in type. (4) It is quite difficult to explain the renal suppression. One must consider the possibility of reflex kidney spasm, perhaps, related to the blood transfusions. (5) The acidosis in spite of intravenous glucose and an apparent capable sugar metabolism was rather unexpected. (6) The increasing secondary anemia indicated another blood transfusion, but the possible etiologic rôle of transfusions caused us to refrain. (7) The prognosis during the last five days was very poor in spite of the increased urinary output, as the blood urea and creatinine were still increasing and the quantitative determinations on the urinary nitrogenous constituents showed the increased secretion to be only of the fluid elements. (8) The upper abdominal hemorrhage is probably explainable by a massive diapedesis.

CYSTIC FIBROID WITH TWISTED PEDICLE, SIMULATING AN OVARIAN CYST

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THE chief interest of this type of uterine tumor lies in the difficulty of a correct clinical diagnosis, because of close resemblance of the physical findings to an ovarian cyst. Although our specimen by its size and weight occupies a very modest place among the host of others, it has the distinguishing feature of possessing a twisted pedicle, a fact which makes the clinical picture still more confusing and the similarity to an ovarian cyst with the same complication, still more striking.

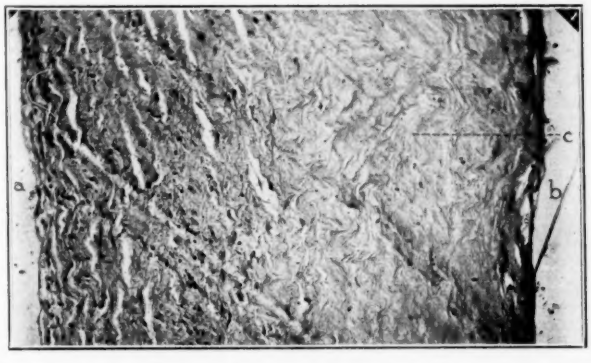

Fig. 1.—The thinnest portion of the sac, 1 mm. thick, with both margins are devoid of epithelium, ×240, (*a*) Outer surface of the sac, (*b*) inner surface of the sac, (*c*) area of hyaline degeneration.

Because of the fact that this type of tumor is not sufficiently dwelt upon in the textbooks of gynecology and even in gynecologic monographs and the condition is often not recognized, we believe its presentation might be of some interest.

The specimen was obtained from an autopsy of an unmarried white woman of sixty-nine at the Lutheran Deaconess Hospital of Chicago.

The patient was admitted to the hospital with complaints of swelling of her legs and general weakness. The patient stated that most of her troubles began about two months prior to the admission to the hospital. General weakness grew gradually worse; dyspnea, edema of the legs, gastric disturbances, constipation, pain in the cardiac region and over the left shoulder, frequency of urination, loss of weight were the symptoms that developed in the next two months. The past history was of no importance. Menopause occurred twenty years ago. There were no gynecologic complaints. Upon physical examination the abdomen was found enlarged and

signs of free fluid could be elicited; the lower extremities were edematous, action of heart irregular (auricular fibrillation); blood pressure S. 230, D. 140 mm. Hg. Repeated uranalysis revealed trace of albumin and no other abnormalities. Blood count showed a moderate leucocytosis of 11,300 with a practically normal differential count.

The symptoms progressed unfavorably and the patient died with signs of uremia, February 22, 1930, after three and one-half weeks' stay in the hospital.

At the autopsy there was found a generalized arteriosclerosis and especially of the coronary arteries; hypertrophy of the myocardium; arteriosclerotic kidneys. The abdomen contained about a liter of clear serous fluid and a large cystic tumor that arose from the uterus.

The cystic mass was attached to the posterior surface of the corpus uteri by a pedicle twisted about its long axis to 180 degrees and measuring 4 × 3½ × ½ cm. (after formalin fixation). The base of the tumor was solid but the major portion

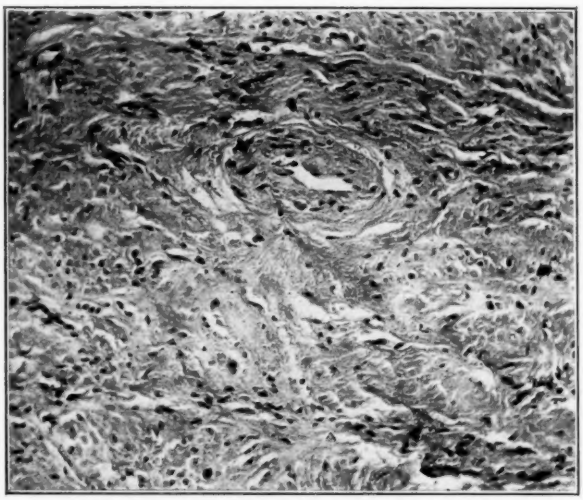

Fig. 2.—Section from the solid portion of the tumor, showing myomatous tissue interspersed with fibrous stroma, and small areas of hyalinization. Occasionally edema is seen. ×240.

was thinned out into a sac. The sac in its fresh state measured 25 cm. in diameter and was filled with clear straw-colored fluid. The solid portion of the tumor was ovoid and measured 9 × 8 × 3 cm. (after formalin fixation). The outer surface of the sac was of grayish pale color, smooth and glistening. The inner surface was uneven, trabeculated and had several small compartments. The thickness of the sac varied from 1 to 10 mm. and in many areas it was transparent.

Both ovaries were atrophied. The fallopian tubes did not deviate from normaley. The body of the uterus contains several other small fibroids, one of which at the lower end of the corpus was 3 cm. in diameter, hard as a stone and did not yield to the knife. The endometrium was smooth, atrophic and the uterine cavity distorted but small.

Histologically, the solid part of the tumor and the cystic sac consisted of a fibromuscular structure with slight predominance of fibrous tissue, which formed bright red bands in the van Gieson Stain. Many areas of hyaline degeneration were seen here and there within the substance of the myomatous tissue. The inner

surface of the sac did not reveal any epithelial lining. The thinner the wall of the cyst, the more fibrous tissue appeared under the microscope. The small fibroids revealed a considerable amount of myomatous tissue and a fibrous stroma.

It is quite possible that the fibrocysts are not as common as indicated because under this title have been included uterine cysts lined with epithelium. True fibrocysts have no epithelial lining and the earlier authors did not furnish evidences that their specimens were devoid of an epithelial lining inasmuch as no histologic studies were reported.

The frequency of such tumors, their pathology and clinical importance will be considered further. The fibrocysts are derived from solid fibromyomas, but the process by which the cystic transformation occurs is not quite clear. Some authors regard a previous fatty degeneration as the cause of the cyst formation, because in some cases

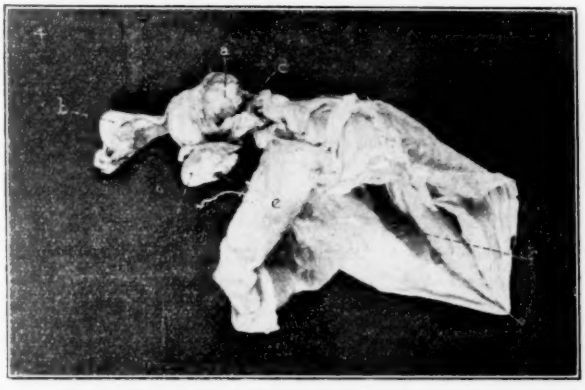

Fig. 3.—The gross appearance of the tumor and uterus with adnexa. (*a*) Calcified small fibroid at the corpus uteri, (*b* and *c*) both adnexa. (*d*) uterine cavity, (*e*) the solid portion of the tumor, (*f*) the cystic sac, folded upon itself.

the cystic contents contained crystals of cholesterin; others as Kelly, for instance, consider hyaline degeneration an important factor in this process; there are some who attribute the cavity formation to a previous hemorrhage into the substance of a solid fibroid, which by gradual enlargement further distends the original small cavity into a large cystic space; still others believe that distention of the lymph vessels is the cause of the cyst formation.

Like the solid fibroids, the fibrocysts occur most often during the period of sexual activity of women, more frequently in married and parous women, although aged, nulliparous, and virgins are not spared. We have a better knowledge of the pathology of such tumors than of their etiology.

Cystic fibroids of the uterus are classified according to their site of origin, as subserous, intramural or interstitial and submucous. The fibrocysts have usually a pedicle, more or less broad, and most fre-

quently they arise from the posterior wall of corpus uteri, although almost any other possible area of this organ has been described as the site of origin in isolated cases. The cystic portion represents a sac of various thickness; the inner surface is uneven, in many instances there are small cystic cavities, communicating with each other. The size varies from that of a walnut to enormous dimensions, surpassing several times a uterus at term. In some instances they acquire almost fabulous dimensions, as in the case of Severanu, in which case the tumor weighed 195 pounds (quoted from Webster), of Hunter, 140 pounds, of Stockard, 135 pounds, of Ulyanowsky, 88 Russian pounds, of Kelly, 89 pounds, of Webster, 78 pounds, Theile, 81 pounds. As a rule there are numerous adhesions to the abdominal viscera, much more frequently than the ovarian cysts for which they are often mistaken. When the nutrition of the pedicle is impaired, necrosis may occur and the tumor becomes free and is classified as "parasitic" or "wandering." When the base of the fibrocyst is broad and intimately connected with the uterine wall, the latter organ is often found hypertrophied, its cavity elongated and distorted. In a few instances the cysts become inflamed and their contents purulent. In the case of Routh (quoted from Heer) pure pus was found in the cystic cavity. In recent literature a similar case was reported by Mignon.

The contents are usually straw colored but may be brownish or red from admixture of blood and in the majority of cases coagulate on exposure to air. The fluid of an ovarian cyst as a rule does not coagulate.

Histologically fibrocysts consist of muscle bundles with more or less admixture of fibrous tissue. There is no epithelial lining in the true fibrocysts. In many instances areas of hyaline degeneration and edema are described.

The symptomatology of the fibrocystic tumors resembles that of a solid fibroid and depends largely upon the size of the cyst and its relationship to the uterus. When the tumor has a broad base and is intimately connected with the substance of the myometrium, the disturbances of menstruation, such as irregular periods, too frequent and prolonged menstruation, menorrhagia, and dysmenorrhea are frequently produced.

These tumors after a long period of quiescence begin to grow rapidly and within a comparatively short period of time may acquire colossal size and thereby cause distinct signs of pressure, such as dyspnea, palpitation of the heart (due to the raised diaphragm) hydrothorax, varicosities, and cyanosis of the lower extremities.

The submucous fibrocysts may excite attacks of labor-like contractions of the uterus, due to the efforts of this organ to expel its contents. A case like that was described by Gusserow. In a few cases, the patients complained of increase in size of the abdomen during the

menstrual periods. Heer mentions this phenomenon in his excellent monograph on fibrocysts, and Kelly and Cullen in their *Fibromyomata of the Uterus.* Spontaneous rupture of a fibrocyst is very rare, but is described in a case by Zeller and Anderson, and by Beatty (both cases cited from Heer's monograph). A number of authors observed a uterine souffle (bruit), which is due to the presence of large blood vessels. Dystocia in cases of pregnancy has been described quite often, the severity of which depended upon the size of the tumor and its relation to the birth canal, as in any other large pelvic tumor.

The diagnosis of these tumors is quite complicated, as it has been said before, the chief difficulty lies in mistaking them for ovarian cysts. The resemblance on physical examination is remarkable indeed. If one takes into consideration the fact that although the tumor in question feels like an ovarian cyst, the clinical behavior resembles a fibroid to a great extent in causing menorrhagia, metrorrhagia, irregularity and enlargement of the uterine cavity. The peculiar course of the fibrocystic tumor, namely, the rapid growth after a long period of quiescence may be helpful in arriving at a correct diagnosis. It should be remembered that an ovarian cyst gives a feeling of elasticity, and fluctuation; the sac feels more or less smooth, while the fibrocystic tumor besides having a fluctuating area, gives also the impression of a firm, even hard mass, with uneven contours, a mass which bears resemblance to a fibroid. This combination of signs of both fibroid and cyst is characteristic of a fibrocystic tumor.

The coagulation of the cystic contents upon exposure to air has been considered a pathognomonic sign of a fibrocyst, but has no practical value. The procedure of aspirating the cyst is not to be recommended, because of possible infection. Caution in this regard deprives us of another sign, namely, in the case of an ovarian cyst (not dermoid though) the withdrawal of fluid leaves the sac soft and collapsible, whereas a hard mass of various size is the result of an aspirated cystic fibroid.

The cystic fibroid may be quiescent for some time or when left alone, they may acquire considerable size and impair to a great extent the health of the patient. There were fatal outcomes in patients not operated upon because of disturbed circulation, breathing, and even cachexia. A removal of the tumor gives a good prognosis; the great mortality of the early authors was due to error in their technic. Poor hemostasis and aspiration of the cystic contents caused an appalling mortality in early days of surgery. At the present time operative interference is not only feasible but strongly advisable as soon as the rapid growth of the cyst is observed.

A few cases, which illustrate the pathology most clearly will be quoted briefly. Kelly and Cullen described a patient who suffered from considerable intraabdominal pressure. Dyspnea was so marked that it was necessary to perform the operation

in a semisitting posture of the patient. The abdominal incision measured almost 4 feet and the cystic tumor upon removal weighed 89 pounds. In another patient of the same authors the fibrocyst weighed 39 pounds. The interesting feature was the increase of the girth of the patient during menstrual periods. Histologically, the solid and cystic parts of the tumors showed myomatous tissue with areas of hyalinization. No epithelial lining was found in the sac.

Stone's case is worthy of mention, because the tumor became "wandering" or "parasitic." A woman of fifty-five years, single, had a tumor for years which was diagnosed as ovarian cyst. The operation revealed a cystic tumor lying practically free in the abdominal cavity. The only attachment was found near the right parovarium. The author assumes that possibly a narrow pedicle became twisted; the tumor sloughed off, to become a free mass in the abdominal cavity.

We may add here that there are very few cases of fibrocysts with torsion of pedicle reported. We know of Kelly's case and Stone's parasitic tumor (probably). Our own specimen revealed this feature very distinctly.

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Jones, W. J., and Bunting, C. H.: Invasion of the Fallopian Tube by Oxyuris Vermicularis. Arch. Path. **11:** 229, 1931.

A case is reported of a girl aged twenty-two operated upon for appendicitis. A typically inflamed appendix was removed through a right rectus incision. On further abdominal exploration, the left tube and ovary were found adherent and much enlarged. A left tubo-oophorectomy was also done, the patient making an uneventful recovery. Gross section of the appendix revealed numerous oxyuris ova. The left fallopian tube showed a marked purulent salpingitis. Histologic examination of the tube showed a female oxyuris in its wall, the parasite being heavily laden with ova. The area containing the parasite was surrounded by a necrotic zone and numerous eosinophiles but no mononuclear phagocytes were found.

The authors call attention to the fact that oxyuris ova are commonly found in the lumen of the appendix; when found in the wall of the appendix, a true appendicitis may occur. As for the association of the two lesions, it may be recalled that at night there is noticed a marked perineal itching at which time the female parasite wanders across from the anus to the vagina, enters the latter organ and begins its upward wandering into the internal genital tract. The authors found only two other authenticated cases of invasion of the wall of the tube by oxyuris.

W. B. SERBIN.

A COMPARATIVE STUDY OF THE ASCHHEIM-ZONDEK AND MAZER-HOFFMAN TESTS FOR EARLY PREGNANCY*

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THE importance of determining the existence of the gravid state, together with the varying conditions from which it must be differentiated, have been repeatedly emphasized in the past few years. With the recent advent of the hormone tests for early pregnancy, a great deal of confusion, which hitherto confronted even the most skilled obstetrician, is today being clarified in the laboratory.

Since June, 1930, we have maintained a "Pregnancy Station" for the laboratory diagnosis of pregnancy. Thus far we have chiefly employed two recognized biologic tests, the anterior pituitary hormone test of Aschheim and Zondek, and the female sex hormone or estrin test of Mazer and Hoffman. During this period we have made an investigation of these tests, with the view of ascertaining first, the comparative degree of accuracy of each, when carried out independently and second, the relative value of both tests, considered as one.

The present report is based upon a study of 248 patients, of whom 35 were controls, in whom the diagnosis was definitely known, 200 were problem cases, and 13 involved the question of life or death of the ovum. Many of the urine specimens were sent in by outside physicians, so that it was not always possible to secure a fresh morning specimen so essential for the test. Only those patients who were followed up, and in whom an accurate report, as to the outcome was obtained, are considered in this communication.

It is well known that estrin or female sex hormone does not appear in demonstrable quantity in the blood during pregnancy until eight weeks after fertilization. During this same period, however, demonstrable quantities of this hormone are found in the urine in sufficient amount to be used as a guide for the diagnosis of early pregnancy. In explanation of this apparent discrepancy, Mazer advances the theory that, since the corpus luteum hormone prepares the endometrium for the proper nidation of the developing ovum, its presence in the blood is most essential in the early period of gestation. Female sex hormone, on the other hand, governs growth and vascularization of the uterus, which is less essential at this early stage. This hormone is, in a sense, the antithesis of the lutein hormone, in that it may even produce abortion in the pregnant rat and guinea pig. The elimina-

*Read before the Obstetrical Society of Philadelphia, March 5, 1931.

tion of large quantities of female sex hormone in the urine, in the early part of pregnancy, is nature's attempt, therefore, to maintain a physiologic balance between these two hormones.

Aschheim and Zondek in discrediting this test, argue that the amount of estrin or female sex hormone in the urine is insufficient in the early part of gestation. This is true only if 2.5 c.c. of urine are used, as in the anterior pituitary hormone test. The employment of 12 c.c. of urine, however, which the size of the adult animal permits, eliminates this objection. They further maintain, that they have observed women with amenorrhea, who, although not pregnant, excrete large amounts of ovarian hormone in the urine (hyperhormonal amenorrhea). It must be borne in mind, however, that the demonstrable quantity of hormone, as reported by these investigators and by Frank and others, is found in 250 c.c. of urine, in women suffering from amenorrhea and functional sterility, as compared with only 12 c.c. of urine required for the pregnancy test.

ANALYSIS OF RESULTS

Table I illustrates the results obtained among the 35 control cases. Twenty-five patients were pregnant and 10 were not pregnant. The results were uniformly correct in all instances, according to both the Aschheim-Zondek and the Mazer-Hoffman tests.

TABLE I. POSITIVE CONTROL CASES, TWENTY-FIVE ALL CORRECT POSITIVES

NO. OF PATIENTS	APPROXIMATE STAGE OF PREGNANCY
4	three months
6	four months
6	five months
7	six months
2	seven months
Total 25	

Negative control cases, 10, patients who suffered with various gynecologic disorders. All correct negatives.

TABLE II

PREGNANT PATIENTS	NO. OF PATIENTS
Obesity with amenorrhea	14
One to three weeks after first missed period	42
Fibroid complicating pregnancy	7
Ectopic pregnancy	4
Uterine bleeding during early pregnancy	4
Amenorrhea with tuberculosis	5
Lactation amenorrhea	8
Ovarian cyst with pregnancy	3
Psychosis with amenorrhea	3
Unmarried	5
Sterility 15 yr. with diabetes	1
Sterility 9 yr.	1
Total	97

Tables II and III depict the various conditions encountered among 200 pregnant and nonpregnant women. Only cases involving problems in diagnosis are considered in these two groups. This accounts for the somewhat smaller degree of accuracy than reported by other investigators.

TABLE III

NON-PREGNANT PATIENTS	NO. OF PATIENTS
Delayed period	24
Oligomenorrhea	12
Endocrine disturbance with obesity	17
Pseudocyesis	4
Amenorrhea with tuberculosis	6
Lactation amenorrhea	6
Amenorrhea after radium	1
Amenorrhea two to six months	10
Severe anemia	8
Acute salpingitis with bleeding	2
Graves' disease	2
Missed period after shock	4
Menopause	7
Total	103

TABLE IV.—NINETY-SEVEN PREGNANT PATIENTS, PROBLEM CASES ONLY

	CORRECT POSITIVE	INCORRECT NEGATIVE
Aschheim-Zondek test	80 (82.4%)	17 (17.6%)
Mazer-Hoffman test	74 (76.3%)	23 (23.7%)

ONE HUNDRED AND THREE NONPREGNANT PATIENTS, PROBLEM CASES ONLY

	CORRECT NEGATIVE	FALSE POSITIVE
Aschheim-Zondek test	96 (93.2%)	7 (6.8%)
Mazer-Hoffman test	103 (100.0%)	0 (0 %)

In Table IV, it is noted that among the 97 pregnant patients, 17 results were incorrectly negative by the Aschheim-Zondek test, and 23 by the Mazer-Hoffman test. This is a rather large percentage of error, and indicates that with a single negative result by either test, one cannot be certain of the absence of pregnancy.

We feel, however, that when one analyzes the group of the nonpregnant patients, Table V, the possibility of an incorrect positive result is of much more serious significance and importance.

In the group of 103 nonpregnant women, there were obtained 7 wrongly positive reactions by the Aschheim-Zondek test; whereas there were no false positive results with the Mazer-Hoffman tests.

Mazer and Hoffman, in a study of 164 nonpregnant women, obtained a false positive Aschheim-Zondek reaction in 16 (10 per cent). In the light of our recent knowledge of the physiology of the anterior pituitary gland, it is not difficult to explain this large percentage of false positives.

TABLE V

	ASCHHEIM-ZONDEK	MAZER-HOFFMAN	CLINICAL FEATURES AND FOLLOW-UP
(1)	Neg. Neg.	Neg. Neg.	Three months pregnant. Had stillbirth following day.
(2)	Pos.	Neg.	Bled profusely. Two months pregnant. Later had D. & E. for dead ovum.
(3)	(a) Neg. (b) Pos.	Pos. Pos.	Two months' pregnancy. Severe nausea. Occasional uterine bleeding. Patient carried to term.
(4)	(a) Neg. (b) Pos.	Pos. Pos.	Apparent cessation of uterine growth. Patient carried to term.
(5)	(a) Neg. (b) Neg.	Neg. Neg.	Three months' pregnancy. Intrauterine fetal death. D. & E. later performed.
(6)	(a) Pos. (b) Pos. (c) Neg.	Neg. Neg. Neg.	Enlargement of uterus, but patient bled each month. Patient later miscarried.
(7)	Pos.	Pos.	Two months' pregnancy. Profuse bleeding after taking emmenagogues. Patient carried to term.
(8)	(a) Neg. (b) Neg. (c) Pos.	Neg. Neg. Pos.	Two months' pregnancy with bleeding. No dilatation of cervix. Bleeding continued for two weeks. Then both tests became strongly positive and bleeding ceased; patient going to term.
(9)	Pos.	Neg.	Patient aborted at four months.
(10)	Pos.	Neg.	Pregnancy of two months with bleeding. D. & E. performed for dead ovum.
(11)	Neg.	Neg.	Continuous bleeding after two weeks of amenorrhea. Patient probably had an abortion.
(12)	Neg.	Neg.	Six months' pregnancy. No fetal movements. Dead baby delivered.
(13)	Neg.	Pos.	Amenorrhea of six months. Uterus enlarged in size the first two months; when all symptoms disappeared. Missed abortion. Four months later patient bled profusely. Had D. & E. performed for small dead ovum. (Persistent corpus luteum?)

Fluhmann has shown that normal fertile women, and those suffering from hypofunction of the anterior hypophysis, rarely, if ever have a demonstrable quantity of anterior pituitary hormone in the blood, except during pregnancy.

According to Rowe and Lawrence, primary anterior pituitary hypofunction is nearly five times more frequent than either primary ovarian or thyroid hypofunction.

Fluhmann, however, found a demonstrable quantity of anterior pituitary sex hormone in the blood of castrated women, and in those in whom the natural menopause was well established.

Pituitary hypertrophy following castration in the human being, was previously noted by Tandler and Grosz, evidently in an attempt to stimulate a poorly functioning ovary. Experimentally, Evans and Simpson and Engle have shown that the hypophysis of gonadectomized animals, possesses an activity, five times greater than the normal animal.

In a group of 18 sterile women, suffering with amenorrhea, but without any evidence of pelvic disease, Mazer found that 8 or 44.4 per cent showed a demonstrable quantity of anterior pituitary hormone in the blood. In a study of 30 women, suffering with delayed or scanty menstruation, he found the hormone in the blood in 6 or 20 per cent. Among 13 women in the early menopause, 7 positive reactions for anterior pituitary hormone in the blood were obtained, due, perhaps, to the hypertrophic changes in the gland. It is easily conceivable that this abnormal excess of hormone in the blood might also appear in the urine, so that these women may yield a falsely positive Aschheim-Zondek test for pregnancy.

The 7 false positives noted, all occurred in endocrine types of cases, which considerably detracts from the reliability of the test.

When the Mazer-Hoffman test was simultaneously employed in the group of 103 nonpregnant women, however, no positive results were obtained. It is evident that the error which may occur in the anterior pituitary hormone tests is practically eliminated with the female sex hormone test.

Frank has shown that many patients who fail to menstruate, even over long periods of time, may have, at the most, only a regular blood cycle of female sex hormone at a subthreshold level. This is insufficient to render a false positive reaction.

One must bear in mind, however, the possibility of a condition of hyperfunction of the ovary, which might increase the amount of female sex hormone and render a false positive. Frank has reported cases in which a liberal mouse unit of female sex hormone was obtained from only 20 or 30 c.c. of blood taken three to five days before the expected period, instead of from the usual 40 c.c. required. In such cases, it may be argued, one might occasionally obtain a false positive test for pregnancy. Thus far, however, we have not observed such a reaction in any of our patients.

A comparative analysis of the two tests performed in a group of 13 problem cases, involving the possible death of the ovum, brings out several factors of interest.

In 4 patients (Cases 2, 6, 9, and 10), who gave a positive Aschheim-Zondek reaction and a negative Mazer-Hoffman test, a miscarriage (i.e., death of the ovum) later followed.

In 4 patients (Cases 1, 5, 11, and 12) both tests remained persistently negative. In each case, a dead ovum was subsequently expelled.

In Case 8, two negative tests, both Aschheim-Zondek and Mazer-Hoffman were followed by a positive reaction. Almost simultaneously, the uterine bleeding ceased, and the gestation continued.

A positive Mazer-Hoffman test or repeated negative tests, in questionable cases, thus seem to have much prognostic value. A sound physiologic explanation may be offered for the evident accuracy of this test.

The function of the corpus luteum in producing an endometrium sensitizing, ovulation inhibiting hormone, is today well established. It is also recognized as the chief source of estrin or female sex hormone in the early part of pregnancy, to be supplanted later by the placenta. Through the influence of the corpus luteum, the uterus is brought into a pregravid condition, in preparation for the reception of the fertilized ovum. During pregnancy, the corpus luteum inhibits follicular ripening, as well as the cyclic engorgement of the genitals, which might disturb the developing ovum. If fertilization fails to occur, however, or the fetus dies, regressive changes in the corpus luteum or placenta have either already occurred, or take place immediately thereafter. The source of supply of the female sex hormone is thus instantly severed, and the Mazer-Hoffman test for pregnancy, which depends upon the activity of this hormone, is rendered negative.

The withdrawal of the hormonal production of the anterior pituitary gland appears, however, to be more delayed after the fetus is no longer viable. Although the ovum may be dead, as long as living syncytial cells or trophoblastic elements are present in the walls of the uterus, they either produce anterior pituitary hormone themselves or continue to stimulate the anterior pituitary gland. This is the explanation for the positive Aschheim-Zondek reaction, after the expulsion of an hydatidiform mole. This may also explain the occurrence of a positive Aschheim-Zondek reaction and a negative Mazer-Hoffman test in four patients who eventually were proved to have an inevitable abortion.

CONCLUSIONS

1. The anterior pituitary hormone test of Aschheim and Zondek is a reliable laboratory adjuvant for the diagnosis of early pregnancy. In our hands it yielded 82.4 per cent correct positives and 93.2 per cent correct negatives. The finding of 6.8 per cent false positive results, detracts, somewhat, from its complete reliability. Especially is this error likely to be encountered in women who are functionally sterile, due to endocrine disturbances, or in women approaching the menopause. In these women, a compensatory hypertrophy of the anterior hypophysis may produce an excessive quantity of hormone, which, finding its way into the urine, will render an incorrect positive.

2. The female sex hormone test of Mazer-Hoffman yields a smaller percentage of correct positives (76.3 per cent) but is somewhat more reliable in the positive diagnosis of pregnancy, especially in patients suffering with functional disturbances. A smaller percentage of false

positives, among nonpregnant patients (none in our series), was observed, when this test was employed. This is probably due to the fact that hyperfunction of the ovaries, which would be necessary in order to produce an excess of female sex hormone in the urine, and render a false positive, is rarely, if ever, found in cases of endocrine dysfunction.

3. In those patients in whom there is a question of a dead fetus (missed abortion), the presence of a positive Aschheim-Zondek and a negative Mazer-Hoffman test, on repeated occasions, denotes that the fetus is probably dead. It appears that the female sex hormone disappears from the urine somewhat earlier than does the anterior pituitary hormone.

4. Repeated negative Mazer-Hoffman tests in pregnancy in those cases accompanied by slight bleeding, denotes an insufficient quantity of female sex hormone, and a threatened abortion. Only when the female sex hormone appears in demonstrable quantities in the urine, may one feel assured that the ovum has secured a firm location, and that the pregnancy may continue.

5. The larger percentage of correct positives with the Aschheim-Zondek test, and the smaller percentage of false positives with the Mazer-Hoffman test, suggests that both tests be simultaneously employed in every instance in order to yield the most accurate results.

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(For discussion, see page 135.)

Schmidt, G.: The Problem of Thromboses and Embolism at the Breslau Woman's Clinic During the Years 1920-1930. Monatschr. f. Geburtsh. u. Gynäk. **87:** 352, 1931.

At the Breslau Clinic from 1920 to 1930 among 6114 gynecologic operations there were 134 instances of thrombosis (2.19 per cent) and 26 fatal pulmonary emboli (0.42 per cent). Among 10,297 confinements including 973 premature labors and abortions there were 102 cases of thrombosis (0.98 per cent) and 6 fatal pulmonary emboli (0.05 per cent). The author rules out intravenous injections as a cause of thrombosis. On the other hand, important predisposing factors in the formation of thrombi are the constitution of the woman, the social position and the mode of living. In the postoperative deaths from pulmonary embolism the important factors were lowered resistance and poor general condition. A prophylactic measure against thrombosis is systematic exercising during the puerperium. The Trendelenburg operation was performed three times but without success.

J. P. GREENHILL.

OBSTETRIC ANESTHESIA AND ANALGESIA WITH SODIUM-ISO-AMYL-ETHYL-BARBITURATE AND NITROUS-OXIDE-OXYGEN*

By Henry S. Ruth, B.S., M.D., and
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THIS clinical study of the effects during parturition of sodium-iso-amyl-ethyl-barbiturate, commonly called sodium amytal, was made on a series of 30 cases, part ward and part private, at the Hahnemann Hospital and the St. Luke's and Children's Homeopathic Hospital of Philadelphia. There were 21 primiparae and 9 multiparae of whom 4 were para ii, 4 were para iii, and 1 was a para x. The fact that more than two-thirds of the cases were primiparae makes the study a reasonably fair test for a small series of cases, since a primipara requires analgesia over a longer period of time to obtain pain relief.

ESTIMATION OF PREVIOUS AGENTS EMPLOYED

Prior to the agents employed, various preparations and methods were tried and discarded. The problem of the most suitable agent in obstetrics is a complicated one, and greatly dissimilar to anesthesia for general surgery. In obstetrics the pain is more prolonged, yet intermittent. Light anesthesia or analgesia has little application to surgery, but is of paramount importance in obstetrics, operative interferences excepted. The contractile property of the uterine musculature must be efficiently maintained and postpartum hemorrhage minimized. The interests of the child should predominate in the uncomplicated case, for the only consideration for treatment is the relief of pain in the mother.

Chloroform we have discarded because of its toxicity. There is an inherent possibility of sudden death by direct action on the cardiac musculature. Its deleterious effect on liver substance and function is well known, which doubly contraindicates its use in a condition where hepatic dysfunctions are prone to prevail. There is no scientific proof for the time-worn adage that chloroform is better tolerated in the presence of pregnancy.

Ether by inhalation is not wholly satisfactory for many reasons. Its stage of analgesia is not pronounced. Respiratory irritations, blood chemistry imbalances, and aggravations of renal disturbances coincident at times with its use, generally speaking, and, specifically, its inhibiting action on uterine contractions, make this agent far from

*Read at a meeting of the Obstetrical Society of Philadelphia, March 5, 1931.

ideal. Colonic ether, in its many suggested forms, is slightly more advantageous, but the possibility of colonic irritation and the uncertanty of its effectiveness, constitute serious detrimental factors to its use.

The authors next attempted sacral and caudal block anesthesia in a small series of cases. The pregnant abdomen makes the prone position, which is necessary for a skillful injection, very uncomfortable. The length of resulting anesthesia is not sufficient, for many babies were delivered after its effect had disappeared. The painful stimuli from the birth canal only were obviated, the contractions of the uterus being unaffected as to both sensory and motor nerve control. Many patients objected to the numerous injections necessary, which were painful without the customary preliminary hypodermic of morphia.

Nitrous-oxide-oxygen was employed for a long period of time, with excellent maternal and fetal results. This agent possesses many attributes which render it peculiarly adaptable for obstetrics. The great difficulty was in the inconvenience and expense of having the anesthetist available over a long period of time to administer analgesia with each contraction. Especially in primiparae, we were under the impression that the effectiveness of labor was diminished by its use in the first stage.

Sodium amytal was then tried out. Criticism has been directed toward this drug, most of which, however, we believe to be unjust. Unfortunately, the manufacturers supplied quantities to physicians who were not well versed in the principles of intravenous therapy, the action of the barbiturates, and the art of anesthesia. Consequently, rumors of deaths have circulated, but as yet, no official report has come to our notice. Unfortunately, when first introduced, sodium amytal was exploited as an anesthetic as well as a hypnotic. Clinical application has demonstrated that it is unjustifiable to attempt general anesthesia with its use, for a toxic dose is necessary to produce a condition which at best only simulates anesthesia. Nevertheless, the drug received a false stigma for failing to do what never should have been recommended.

DESCRIPTION OF THE TECHNIC OF THE COMBINED ADMINISTRATION

The result sought was that there should be continuous analgesia from the time of administration of the drug until the birth of the baby. A general anesthetic, usually nitrous oxide and oxygen, was given for the actual birth and for the inspection of the cervix and perineum and all repair work.

After the cervix has reached a dilatation of from 4 to 6 cm. sodium amytal is administered intravenously. Only the maximum dosage to be employed is calculated and that by the maternal body weight, namely, 15 mg. per kilo. We make no other effort to predetermine the dosage required any more than we would attempt to predetermine the amount of ether to anesthetize a patient.

The superficial surface over the vein selected is prepared as for any intravenous

therapy and protected by sterile drapings. Ten c.c. of a *freshly prepared* 10 per cent solution in a 10 c.c. syringe is injected at the rate of 0.25 c.c. per fifteen seconds or *slower*. The patient is requested to keep her eyes open. An assistant observes the blood pressure readings. A severe blood pressure fall would contraindicate further injection. Whenever the patient closes her eyes, she is requested to open them. The more difficult it is for the patient to open her eyes, the slower the injection is made. The injection is temporarily stopped when she will no longer respond. No more is administered until the arrival of the next contraction. If this awakens the patient, 1 c.c. more is injected if she has a high tolerance for the drug and 0.5 c.c. if her tolerance is low. Again, the next contraction is awaited with the same course of action. As soon as two successive contractions have occurred, with the patient merely muttering softly to herself and not opening her eyes, the first administration is completed. We are then confident that she is not only analgesic, but amnesic as well.

If the first injection does not remain effective until actual delivery, as may occur in long labors and, because the time of analgesia varies with the individual, we have no hesitancy about administering the second dose. However, since all of the initial dose has not been eliminated, great care should be exercised in giving the second one still more slowly, or the undesirable restlessness of a slight overdose will present itself.

The pains of the contractions will often cause the patient to attempt to move her arms. For this reason, a nurse should hold her arm as quiet as possible, and the anesthetist, by resting the hand holding the syringe on the patient's arm, will avoid infiltrating during the unavoidable slight movement, for his hand will move with the arm.

As the effects of the sodium amytal disappear, if the second stage has been reached, nitrous-oxide-oxygen analgesia is begun. To be successful with gas-oxygen analgesia, the speed of onset of the contraction as well as the individual oxygen requirements of the patient must be taken into consideration. The mother notifies the anesthetist as soon as she is aware of the approaching pain. If rapid, perhaps only one or two deep breaths of a 95-5 per cent or 97-3 per cent mixture are given, and the patient is told to hold the second breath as long as possible and bear down. After each successive breath she bears down until the contraction has ceased, but the mixture should be immediately returned to one of a higher percentage of oxygen after the first breath held, or undesired anesthesia will result. If the onset is slow, three or four breaths of a 90-10 per cent or 88-12 per cent mixture will be sufficient and the third or fourth breath the first one to be held. Experimentation and previous experience will allow the anesthetist to adjust the mixture of nitrous-oxide-oxygen to the optimum combination for efficiency after only four or five contractions.

For the actual delivery, or for operative interference, full anesthesia is instituted. In normal and operative deliveries other than cesarean sections, no rebreathing should be allowed, for the respiratory stimulating properties of carbon dioxide may cause the child to attempt to breathe in the birth canal and inspire blood, mucus, etc. For cesarean section, this will not occur and stimulative or slightly excessive rebreathing before delivery will be an aid toward resuscitation. Nitrous-oxide-oxygen, if thoroughly understood by the anesthetist, will provide satisfactory relaxation for all operative interference, save possibly internal podalic version.

CLINICAL OBSERVATIONS

Time of Injection.—It was found that the time of administration of sodium amytal in the course of labor is important. In a primipara,

the drug should not be injected until the cervix is partly effaced and dilated about 5 cm. The rhythm of the contractions should be well established, occurring every two to four minutes, and lasting forty-five seconds to one minute. In multiparas, the drug may be administered earlier, but pains should be regular and fairly strong; i.e., not more than three to four minutes apart and lasting at least forty-five seconds. If sodium amytal is administered at an earlier stage of labor, it may cause delay, as the interval between contractions is then prolonged and the strength of each contraction slightly diminished. On the other hand, when labor is further advanced, with strong and frequent contractions at time of administration, there is little or no effect observed on the strength and frequency.

Dosage.—It is important to note that the dose should not be based as much on the weight as upon the individual patient's reaction to the drug. The usual analgesic dose is calculated as 15 mg. for each kilo of body weight, but only twice was this dose used. In 4 cases the dose was between 90 per cent and 99 per cent of this dosage; in 3 cases, between 80 per cent and 89 per cent; in 8 cases, between 70 per cent and 79 per cent; in 6 cases, between 60 per cent and 69 per cent; in 5 cases, between 50 per cent and 59 per cent; in 1 case, between 40 per cent and 49 per cent; and in 1 case, between 30 per cent and 39 per cent. In most cases, therefore, it is not necessary to use as much as the calculated analgesic dose and, as the toxic dose is far greater than the analgesic, it will be seen that the danger point is never approached. The rate of injection is important and, as previously advised, should not be faster than 1 c.c. per minute. In two of our cases, Nos. 5 and 6, we tried injecting 2 c.c. the first minute and then 1 c.c. thereafter with the result that narcosis was induced more quickly but it wore off much more rapidly, so that a very unsatisfactory effect was obtained. In all other cases where there was no change in the rate of injection, analgesia was not obtained so quickly, but the effects lasted much longer.

Effects on the Patient.—The action is prompt and before the needle is withdrawn the patient is in light narcosis. She will sleep quietly between pains, but with each uterine contraction will be partly aroused and show slight restlessness, reply to questions, or complain of discomfort. As the effects wear off, she may apparently regain partial consciousness, but because of the amnesic effect will remember little or nothing of the labor.

When the head reaches the perineum and the general anesthetic, nitrous-oxide-oxygen, is administered, there is complete analgesia with each pain, the patient remaining in light narcosis between pains. She will still respond when spoken to and use her voluntary muscles to help expel the fetus, so that none of the force of labor is lost. Inquiry of the patient's own estimate of the amount of relief from pain that

she received, showed that 22 patients, or 73 per cent of the series received complete, or almost entirely complete, relief from pain from the time of the injection to the end of labor; 4 patients received partial relief, i.e., from 50 per cent to 90 per cent; and 4 patients received but little relief and were classed as failures.

Of the four failures, two of the patients were those in whom we attempted a rapid administration of the drug in the first minute with the result that although analgesia was quickly obtained, it soon wore off so that the desired effect was lost. In the other two cases, the drug was given too early, with the result that there was some slowing down of labor until the effects wore off, when labor proceeded again without analgesia. Our four failures were due to errors of application rather than a failure of the drug to act.

Restlessness is a symptom frequently reported by other investigators of the clinical action of this drug and, in our opinion is its most unsatisfactory manifestation. From our observation, we would say that it is largely dependent upon the temperament of the patient and the quantity of the drug administered. A patient with an excitable temperament is far more prone to develop restlessness than one in a calm, cheerful frame of mind. On the other hand, the larger doses of the barbiturate will cause restlessness, even in a calm temperament. Correct technic in administration will control this. Therefore, it is important, when injecting the drug, to adjust the dose to the requirements of that individual, namely, enough to produce analgesia, but not enough to cause restlessness. The ability to judge the correct dose of sodium amytal, or any other anesthetic agent, such as ether or nitrous-oxide-oxygen, depends upon the experience of the one administering the drug. The dose will be governed by the reaction of that particular individual, rather than by an arbitrary calculation based on the body weight. The degree of restlessness which occurred in this series included 1 case of severe restlessness; 3 of moderate restlessness; 7 of slight; and 19 with little or none. Of the 11 cases of restlessness, 7 of the patients were of an excitable temperament and 4 calm.

Duration of Effects.—The longest period of analgesia was seven hours, and the shortest forty-five minutes. In 2 cases repeated doses were used and analgesia was obtained for three and one-half and five hours respectively. In general, an effect lasting two to four hours is obtained. This may be augmented or even extended by the use of nitrous-oxide-oxygen. However, gas and oxygen should not be started until the second stage of labor. If the effects of the barbiturate begin to wear off before this time, a second injection may be given. This dose, of course, should be much smaller.

Effects on Labor.—Sodium amytal has little or no effect on a normal labor if given at the proper stage. The only deleterious effect ob-

served is a slight lengthening of the interval between pains, and of the strength. This soon wears off and labor continues as before. This effect was observed in 10 cases or 33 per cent of the series. In those cases where a prolongation of the interval between pains occurred, the drug was administered earlier in labor. When the cervix is dilated between 5 and 10 cm. before injection, little or no effect on the uterine contractions was observed. The effect on the cervix is that of relaxation. A spastic cervix or retraction ring of the lower uterine segment will relax, under the effect of the drug. In this respect, the drug would seem to be of great value and may shorten the time of first stage labor. Case 1 illustrates this point.

A primipara with normal pelvis at term. The patient had been in labor eighteen and three-quarters hours but there had been no progress for four hours. The cervix was only partly effaced and dilated 6 cm. with the occiput on a line with the ischeal spines. L.O.A. position. There were good contractions of fifty to sixty seconds' duration occurring every five to six minutes. A diagnosis of spastic cervix or retraction ring was made. The patient was given 1 gm. of sodium amytal intravenously which was the full analgesic dose for her weight of 69.9 kilos. The effect was remarkable. The patient was in complete analgesia with no change in the interval and strength of the contractions and in two hours and forty minutes the cervix was completely dilated and the head had descended 2 cm. One and a half hours after this the patient was anesthetized and delivered by forceps because of a definite slowing of the fetal heart. In this case, the patient made more progress in the five hours of analgesia than she had in the preceding nineteen hours. We have seen this effect in one other case which is not included in this series.

The longest second stage for primiparae was two hours and forty minutes; the shortest, twenty-five minutes, and the average, one hour and twenty-five minutes. For multiparae the longest was two hours and twenty-nine minutes, the shortest, ten minutes, and the average, forty-six minutes. Because of the fact that forceps were used in a number of cases, thus shortening the second stage of labor, no deductions can be made from these figures. However, it is our observation that sodium amytal has little or no effect on second stage, neither shortening nor prolonging it.

Sodium amytal is also useful when used as a sedative to promote rest during a long labor, as shown in the following case:

This patient was a primipara with a flat rachitic pelvis. She had been in labor twelve hours and had begun to develop signs of fatigue. The cervix was partly effaced and dilated 3 cm., the head was in R.O.P. position and 3 cm. above the ischeal spines. Seven-tenths gm. of sodium amytal was given intravenously which put the patient at complete rest for three and one-half hours, at the end of which time she awoke much refreshed and labor continued satisfactorily, being terminated by low forceps.

Sodium amytal has no effect on the fetal heart rate before birth. It does not have any effect on the respirations or heart after birth, so

that resuscitation is the same as if no analgesia had been given. However, it does make the baby drowsy for the first twenty-four or forty-eight hours. This phenomenon was present in 14 cases or nearly 50 per cent of the series, but as this did not seem to affect the baby in any other way, we do not consider it a serious drawback.

CONCLUSIONS

Sodium amytal has two disadvantages: first, administration requires some technical skill and, therefore, the drug cannot be administered by a nurse; second, that it produces restlessness.

In comparison with other forms of obstetric analgesia, we would say that this method of using sodium amytal intravenously in conjunction with nitrous-oxide-oxygen presents the following advantages: an immediate positive action, accurate control of dosage, no deleterious effect on mother or baby, no deleterious effect on labor if properly given, sustained effect over a considerable period of time, furnishes a satisfactory method of treating spastic cervix or retraction ring, and, gives definite rest in fatigue occurring during labor.

We, therefore, believe that sodium amytal is of definite value in obstetric analgesia, particularly during first and second stage of labor.

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(For discussion, see page 132.)

Dencks: The Relationship of the Female Genital Organs to the Appendix. Monatschr. f. Geburtsh. u. Gynäk. 87: 76, 1931.

The author reports on two patients in whom in spite of three laparotomies the appendix had not been removed and an attack of appendicitis made a fourth abdominal operation necessary. Statistics vary on the frequency of the association of salpingitis and appendicitis. Certain forms of dysmenorrhea have their origin in appendicitis. Further proof that the appendix is frequently an offender is the relationship between appendicitis, cholecystitis and gastric and duodenal ulcers. All these facts speak for the prophylactic removal of the appendix. However, if there are technical difficulties involved in the removal of a harmless appendix, the latter should be left alone, for no unnecessary risk should be taken. The patient's consent for the removal of the appendix should be obtained before operation.

In all cases of appendicitis where adnexal involvement appears to be present, the incision should not be lateral but midline or transverse.

J. P. GREENHILL.

UTERINE ABSCESS, HYSTERECTOMY, RECOVERY*

By R. A. Lifvendahl, M.D., Chicago, Ill.

(From the Department of Gynecology of the Post Graduate Hospital and Medical School)

THE occurrence of a solitary intramural uterine abscess in the puerperium is relatively rare because of certain anatomic factors. The marked vascularity of the puerperal uterus favors a diffuse suppurative process and against solitary abscess formation in the uterine wall. The normal phenomena of uterine involution with compression of the lymphatic and vascular channels by contracting muscle fibers and the occlusive endothelial vascular growth prohibit ingress of pathogenic organisms. However, the placental site is more susceptible because of the greater amount of endometrial denudation, a slower degree of involution, and the comparatively large size of the blood vessels. Most of the cases previously recorded have followed the use of forceps, version and extraction, removal of the placenta, and intrauterine irrigation but instances have been reported after a normal delivery. Trauma to the uterine wall during instrumental attempts at abortion have furnished a moderate number of cases in the literature. Bacteriologic investigation has demonstrated streptococci, staphylococci, colon bacilli, tubercle bacilli and gonococci. Other unidentified organisms as gram-positive cocci in pairs and gram-negative bacilli have been found.

Pathologically, the lesion may be subserous or submucous, but most frequently it does not communicate with the peritoneal or uterine cavities and seems to prefer the cornua as a site of election. It may be the only local cause for the general symptoms or it may give rise to extensive pelvic peritonitis or cellulitis, pyosalpinx, phlebitis, and lymphangitis. The omentum or adjacent intestines may be secondarily involved or perforation may occur into the abdominal cavity. Pichevin and Franque saw patients in whom the purulent contents from the abscess cavity emptied per vaginam. The primary inflammatory process localizes itself in (1) the blood vessels, (2) the lymph vessels, or (3) in the interstitial tissue. In metrophlebitis the veins are directly invaded, become thrombosed and then infected. On the other hand infection may occur secondary to a perivenous inflammatory process. From here infection may extend through the broad ligaments into the ovarian plexus thence into the inferior vena cava or into the left renal vein. If the pampiniform plexus is involved then the hypogastric and the common iliac veins or the tubal or ovarian branches may be

*Presented at a meeting of the Chicago Gynecological Society, March 20, 1931.

thrombosed. In puerperal metrolymphangitis the subserous lymph vessels in the region of the cornua uteri are especially involved and frequently the surrounding myometrium is phlegmonous. Lymphatic spread occurs into the broad ligaments and the retroperitoneal pelvic connective tissue. The interstitial or parenchymatous type of infection may occur particularly after direct trauma to the wall following instrumentation.

REPORT OF CASE

The following history and findings were given by Dr. E. S., who confined the patient.

White, twenty-four years of age, second pregnancy, the first terminated at two months by an uncomplicated induced abortion six months prior to her last preg-

Fig. 1.—Multiloculated intramural uterine abscess filled by organizing thrombus.

nancy. She entered the hospital after a normal prenatal course. The fetal heart tones on entrance were recorded as normal by several observers, in the left lower abdominal quadrant, the cervix dilated to 2 cm., temperature normal, membranes intact, and the mother's condition excellent. Because of the slow progress and some doubt concerning the presence of fetal heart tones after twenty-four hours, an x-ray was taken which showed what was interpreted as a live fetus in cephalic presentation. At the end of forty-nine and one-half hours dilatation was complete with the head in the mid pelvis. An episiotomy was performed, forceps applied and what was described as a macerated fetus was extracted sixty-five minutes after dilatation was complete. Almost immediately following the delivery the maternal pulse became imperceptible, cyanosis was present and it was thought that an intrauterine hemorrhage had occurred, therefore, a manual removal of the placenta was done and the uterine cavity was irrigated with normal saline. Following the administration of stimulants and normal saline solution her general condition improved except for the repeated occurrence of sweats during the subsequent twenty-four hours.

On the second day postpartum the tissues about the episiotomy wound were red, swollen, and tender and by the ninth day there was a large gaping and sloughing wound over which poured profuse and foul-smelling lochia. The leucocyte count on the seventh day was 17,200. Repeated catheterization was necessary on the ninth, tenth, and eleventh days, obtaining from 1,300 to 2,200 c.c. of urine. A blood culture taken on the seventeenth day showed gram-positive paired cocci and the white blood count was now 22,300. The temperature rose to 100.8° on the fifth day and gradually reached 105.4° on the eighteenth day, after a very irregular course. From the fifteenth to the eighteenth day she had numerous chills, perspired freely, vomited several times, and her prognosis became questionable. The temperature curve is somewhat altered due to the fact that aspirin and quinine had been administered.

Consultation was obtained from the medical department who advised blood transfusion if the blood cultures showed no growth.

Fig. 2.—Wall of uterine abscess showing well advanced hyalinizing thrombus in central portion of figure.

On the seventeenth day of this prolonged septic course following delivery she was seen in consultation by E. R. who noted the following on careful rectal examination; a soft, large uterus of decreased consistency with its fundus a handbreadth above the symphysis. To the left of the uterus a lemon-sized and tender mass which showed a slight degree of movability in relation to the uterus, however, tests of movability were not forced for obvious reasons.

Three days after consultation, on the twentieth postpartum day with a temperature of 102.8° the patient was operated upon.

Operation by Dr. Emil Ries. Intrauterine irrigation with normal salt solution. Median incision from symphysis to umbilicus. Careful exploration revealed the enlarged uterus freely movable and examination of the infundibulopelvic and broad ligaments revealed no thromboses in any of the venous plexus. Uterus pulled up into wound by means of forceps applied across broad ligaments. Amputation by conical incision well below internal os across cervix, leaving only a very small cap

of portio vaginalis. Broad ligaments closed and sutured to lateral aspect of cervical stump which was sutured over with bladder peritoneum. Abdomen closed without drainage.

The postoperative course was uneventful except for a rise of temperature to 103.6° on the third day following the operation. Blood cultures taken on the fourth postoperative day were negative for any organisms and the leucocyte count was 13,900 on this day. The patient left the hospital on the twelfth day following the operation and to date is in good condition.

Specimen: The uterus was 12.5 cm. longitudinally, 9 cm. across the fundus, 4.5 cm. through the right horn, and the wall varied from 2.3 to 2.8 cm. The left horn was symmetrically enlarged and had an anteroposterior diameter of 6.3 cm. This region was firm except for a fluctuating focus in the left side of the posterior fundic wall. Sagittal incision through this portion revealed an abscess 2 cm. in the transverse axis of the uterus and from 4 to 8 mm. in the longitudinal and

Fig. 3.—In center a partially thrombosed vessel that leads directly into the cavity of the abscess.

anteroposterior directions. This cavity had an irregular wall which was studded with punctiform dull red areas and was filled by thick, yellowish and creamy liquid. Cultures of this pus showed few nonhemolytic streptococci, gram-positive paired cocci, and gram-negative bacilli. This abscess was separated from the uterine cavity by 1 cm. of myometrium and from the fundic serosa by 5 mm. of similar tissue. Multiple sections of the remaining portion of the uterus revealed a moderately firm musculature that contained no other abscesses. The uterine cavity was lined by red, thin and easily detachable tissue.

The medial 4.5 cm. of the left and 2.5 cm. of the right fallopian tubes were grossly normal.

Two to 4 mm. of the broad ligaments attached to uterus showed no abnormal thickening or thrombi in any of the vessels.

Microscopic Examination.—Uterine wall including abscess area (see Fig. 1) shows the cavity of the abscess traversed by several strands of edematous muscle fibers which separate the space into smaller compartments. These cavities are

filled by erythrocytes and leucocytes in various stages of disintegration. The wall of the abscess is lined by myometrium, fragments of vessel walls, many newly formed capillaries, and in places (see Fig. 2) by large hyalinizing thrombi which are adherent to the wall. Fig. 3 shows a vein containing an organized thrombus and from this vascular channel a tract leads directly into the abscess cavity. Serial sections of myometrium between abscess and underlying uterine cavity show venous channels containing red and white blood cells and the endometrium at this site shows no evidences of regeneration.

Sections from the right and left mid corporeal regions show mucosal glands in various stages of regeneration overlying a myometrium that is the site of slight interstitial edema and hyalinized vessels. Cervix, the small portions of broad ligaments and fallopion tubes are free from any abnormalities except for a moderate amount of interstitial edema.

Discussion.—Etiologically, several factors undoubtedly played a rôle in the pathogenesis of this solitary intramural uterine abscess in that the possibility of carrying virulent organisms into the uterine cavity could have occurred with either or all of the procedures that were resorted to in this delivery; namely, the use of forceps, followed by manual removal of the placenta and then the intrauterine irrigation. Each of these procedures, individually resorted to has resulted in uterine abscesses in some of the cases reported in the literature. The histologic changes indicate that the pathologic condition was an inflammatory process of the blood vessels rather than a lymphangitis or interstitial metritis. This statement is based upon the fact that the contents of the abscess is composed of red and white blood cells, which mixture would hardly occur in a lymphatic channel, in that here the contents would consist of leucocytes only, unless there had been secondary bleeding into the lymphatics. Furthermore, the presence of organized thrombi in the abscess wall indicates that the process had been present for some time. In addition, the finding of a partially thrombosed vessel with a mural defect leading into the abscess cavity points to a primary vascular lesion. Morever, examination of the endometrium in the abscess area shows no evidences of regeneration of the endometrial glands or stroma. This would tend to indicate that the placenta was located here and its site possibly served as a pathway for the bacteria to gain access to the veins.

The diagnosis of a pelvic puerperal infection is usually easy but to localize it as limited to an intramural uterine abscess is almost impossible. The condition is extremely rare as compared to the usual widespread infection, and the lesion is usually small. In this case the swelling of the left uterine horn was sufficiently large to give the impression of a mass that was movable in relation to the body of the uterus. This apparent discrepancy has been explained on the basis of the external uterine surface, overlying the abscess, being movable over the fluctuating area. This same finding has been recently noted by Viridis. This phenomenon would be especially manifest if gas pro-

ducing organisms were present in the abscess. In this case no gas producing organisms were found on culture nor where there any gas bubbles in the interstitial tissue surrounding the abscess. To detect an abscess in the wall after the abdomen is opened is not always possible unless it has attained an appreciable size and is surrounded by considerable inflammatory edema. Thorough palpation of the uterus is not deemed desirable because this may spread infected material into structures beyond the reach of surgical aid. If the infection has resulted in swelling of the subserous layers it can easily be recognized but then it also can be easily ruptured on bimanual examination. Also, this area may be covered by adherent omentum or intestines, freeing which may spread infection into the abdomen before the latter has been packed off. Therefore, the possibility of a uterine abscess being present should always be kept in mind when resorting to operative interference in a puerperal septic case.

In the differential diagnosis a degenerating infected fibroid, pyosalpinx, or a diffuse panmetritis have all been considered in many of the previously recorded cases before the operation or autopsy.

There always exists the uncertainty whether or not the patient might have recovered without operation. We do know, however, that the majority of previously described cases are fatal in that they have been obtained at the autopsy. Also, the mortality in severe puerperal infections is enormous and the general trend at the present time is early and radical surgical treatment, especially in Europe.

Before the abdominal operative work, an intrauterine irrigation of normal salt solution was advisable in order to prevent the escape of any infected material from the uterine cavity during the later operative steps.

In our patient a median incision was made rather than the usual Pfannenstiel incision because preoperatively it was realized that ligation of thrombosed renal veins might become necessary, thus requiring extension of the incision almost to the ensiform process. Also the possibility of carrying infected material into the layers of the flaps in the transverse incision was kept in mind.

Exploration of the possibly thrombosed venous channels was performed with most careful manipulation. After determining the absence of extrauterine venous thrombophlebitis the corpus uteri was delivered into the wound by forceps placed across the upper portions of the broad ligaments near the uterus thus preventing infected intrauterine substance from gaining access to the previously normal venous channels.

The question of a more conservative procedure than a hysterectomy has always been open to discussion. In the literature there are cases in which incision and drainage or excision of the abscess has resulted in the patient's recovery and in several instances a normal delivery

has followed at a later date. Realizing the difficulty of determining how many abscesses are present the safest procedure is to remove the entire uterus. In this patient the typical supravaginal hysterectomy was not done because of the possibility of leaving infected cervical tissue. Instead, only a small shell or cap of the vaginal portion was left behind which gave adequate support to the cardinal ligaments.

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FRACTURED PELVIS IN OBSTETRICS (WITH REPORT OF CASES)*

By William Schuman, M.D., Baltimore, Md.

(From the obstetrical service of the Sinai Hospital)

MODERN methods of transportation, with particular reference to the widespread use of the automobile, have given rise to many new problems. Medicine, along with other sciences and industries, has been tremendously influenced thereby, and while no disease per se has been created, unless it be automobilia (a mental ailment), the great number of injuries resulting from automobile accidents has greatly added to the experience of the surgical and orthopedic practitioner. In obstetrics, as well, we are now beginning to see the effects of trauma in traffic mishaps, the pelvis, of course, being the chief center of interest. Textbooks devote little or no space to injuries of the pelvis and their relation to childbirth, and references in the literature are infrequent, because it has only been during the past decade or less that such cases have ceased to be a rarity. Williams, in his chapter on "atypical deformities of the pelvis" gives an illustration of a fractured pelvis from a case reported by Mars.

The paragraph treating of fractures of the pelvis is so brief that it can be quoted in its entirety. "In rare instances healed fractures of the pelvis may offer an insuperable obstacle to the birth of the child, owing either to an excessive formation of callus or to the projection of the broken ends of the bones into the pelvic cavity. This condition, however, is very rare, as it is stated that only 0.8 per cent of all fractures involve the pelvis, and in such cases the internal injuries are usually

*Read before the Baltimore Obstetrical and Gynecological Society, January 9, 1931.

so severe as to lead to the death of the patient, so that only a small proportion of such women survive, and very few of them become pregnant. The effect upon labor depends upon the location of the fracture and its manner of healing. . . . In a case reported by Neugebauer, in which there was a transverse fracture of the second sacral vertebra, the vertebral column prolapsed into the pelvic cavity and gave rise to a deformity suggestive of spondolisthesis.''

Every physician, particularly the urologist, is familiar with the results of a crushed pelvis, but it is unusual for one to think in terms of obstetrics when one sees a woman or even a little girl who has been in an automobile accident. Naturally, if the woman is known to be pregnant at the time, everyone is concerned not only about her but also for her unborn child. In one of the cases I am going to cite, the woman was three months pregnant at the time of the accident. Most of the few instances of fractured pelvis seen in the parturient are those sustained in early life or when the individual is not pregnant, either before the first pregnancy or between pregnancies.

Since the last edition of his book, Williams has had two cases of fractured pelvis, those being the only two cases among 40,000 deliveries at the Johns Hopkins Clinic. From one he has obtained the pelvis, and it is the only specimen of fractured pelvis in his collection of abnormal pelves.

In a recent article ''Acute Fractures of the Pelvis'' by Lloyd Nolan and H. Earle Conwell of Fairfield, Ala. (January 18, 1930, *J. A. M. A.*) reporting a series of 125 cases of fractures of the pelvis, the authors state:

''It is interesting to note that pelvic fractures in women during the first three years covered by this series, that is from 1920 to 1923, constituted only 10 per cent of the total civilian accidents. Since 1923, or in the last five years, fractures of the pelvis in women amounted to almost 50 per cent of the total civilian cases; 75 per cent of these pelvic fractures in women were received in automobile accidents, and, as far as we are able to judge, such fractures were definitely caused by trauma of less severity than that producing such fractures in men.'' On reading this article, I noted that no mention was made of the obstetric phase of the subject, and hence I wrote to the authors, asking them if they could obtain the obstetric history of these patients subsequent to their fracture. In their reply, they cited just one case as follows:

A primipara, aged twenty-six became pregnant six months after pelvic fracture, which was of the anterior ring, without much deformity but with considerable callus formation. Patient was observed through her pregnancy, and after consideration, it was decided it would be dangerous to allow her to go to full term. Labor was induced at the end of the eighth month, without any complications.

A communication from the New York Lying-In Hospital states that in over 170,000 births, dating back to January, 1890, records show only one case of pelvic fracture, the outline history of which is as follows:

Mrs. J. G., aged thirty-one, white, para 6, applied on August 23, 1929, for care in childbirth. She gave a history of having been in an automobile accident on June 9, 1929, and as a result of the injury sustained at that time, walked with a slight limp. Examination showed patient had a lump on the right descending ramus of the pubis, which was thought to be a callus at the site of a probable fracture. This, apparently, in no way interfered with her labor, as noted below. She was

kept under observation until Nov. 28, 1929, and after a labor of eight hours, ten minutes, was spontaneously delivered of a full-term living child weighing 4,200 gm. Convalescence was uneventful, and patient was discharged Dec. 8, 1929, apparently in good condition.

DeLee writes he has had several cases of fractures of the pelvis in labor. It was necessary in no one of them to do a cesarean section. One had to be delivered on the side to accommodate a proper mechanism of labor.

Greenhill had under his care a doctor's wife, who suffered a fracture of the pelvis just before her first pregnancy. She was delivered by low forceps.

Polak of Brooklyn has had two such cases. Both were caused by the woman being thrown from a horse, and the horse falling upon them. Both fractures included the ilium and pubis. Both healed without any pelvic deformity; each woman has borne a child since without complications, either during pregnancy or labor. The x-ray has shown the fractures well united.

Fig. 1.—X-ray of pelvis of Case 1, showing old fracture of pelvis, marked displacement of symphysis pubis and part of symphysis detached.

CASE REPORTS

During the past few years, two patients giving a history of fractured pelvis, were each delivered twice in the maternity of the Sinai Hospital.

CASE 1.—S. I., aged twenty-one, para i, first appeared in the prenatal clinic April 10, 1929. She sustained a fractured left hip (patient's own words) seven years before, as a result of having been run over by a wagon. Examination with routine pelvic mensuration revealed no apparent deformity of the bony pelvis, measurements being as follows: Sp 26, Cr 28, Tr 30, Bd. 18, C.D. 12. Outlet contracted. IT, 7. Unfortunately, no x-ray was taken during the prenatal period. Her last period was Aug. 15, 1928, making her at term May 22, 1929. The prenatal record showed no complaints that could be attributed to a fractured pelvis. She came to term without lightening occurring. When one month over-

due, July 8, 1929, she was sent into the hospital, the head floating, urine showing a trace of albumin. Blood pressure not elevated. Routine admission examination was essentially negative, there being no atrophy or paralysis; reflexes normal. Patient showed no disturbance of gait or difficulty in walking. Early on the morning following admission, she was given castor oil and quinine, without effect. Eight hours later, more oil and quinine were given, and one-half hour after the last dose of quinine, pains started. The head was not engaged. The cervix dilated moderately slowly, and toward evening ¼ gr. of morphia was administered. At this time, the cervix was about 5 cm. dilated, the head low in the pelvis. At 10:30 that night, the membranes evidently ruptured, and meconium stained fluid came away slowly. Great significance was not placed upon this, however, because of the large amount of quinine the patient had, and because the fetal heart tones remained good. The first stage ended at 1 A.M., July 10, duration twelve hours. The head was now on the perineum, meconium stained fluid continued to drain away. After an hour of second stage pains, the fetal heart became very rapid (170-200) and the patient was delivered with low forceps and episiotomy. It was an R.O.A., and the delivery easy. The baby, which weighed 8 pounds was asphyxiated, and great difficulty was encountered in making it breathe. It died on the second day. Autopsy showed a normal full-term male child with no evidence of trauma externally. Anatomical diagnosis: Partial atelectasis, enlarged thymus—25 gm. (normal 13), peculiar mottling of aorta (not diagnosed).

On the first day of the puerperium, the patient complained of pain in the right foot, and numbness in the right leg and foot. This persisted throughout the twelve days she remained in the hospital, there being no other symptoms or objective findings. Her maximum temperature was 100.2 on the fifth day. Patient returned to the postnatal clinic on August 10, complaining of pain in the right leg. On August 28, she applied to the Johns Hopkins Dispensary, complaining of weakness in the right leg. A member of the staff of the Orthopedic department found a hyperesthesia along the course of the external peroneal nerve, atrophy of the thigh, and calf, one inch. Weakness in the tibialis anticus, posterior tibial, and gluteals. Spine essentially negative.

X-ray showed an old fracture of pelvis, marked displacement of symphysis pubis; part of symphysis broken loose. (Fig. 1.)

She returned to the dispensary a few times for baking and massage, and subsequently, "Social Service" reports, the patient resumed work, apparently not disabled.

On June 16, 1930, I was surprised to see the patient in the dispensary, again applying for a bed in the maternity. The expected date of confinement was July 22, 1930, just one year following her first labor. Pelvic measurements were the same as on her first examination, essentially normal with the exception of a somewhat contracted outlet. The deformity of the symphysis and descending rami of the pubis was easily felt on vaginal examination. X-ray showed the old fracture at the symphysis, pelvic outlet markedly distorted; head of fetus over pelvic brim. Attempts to push the head into the pelvis caused the patient to experience sharp pain in the right gluteal region in the course of the sciatic nerve. This observation was considered significant, recalling her neurologic disturbances in the right lower extremity following her first labor. She was admitted to the hospital on July 23, 1930, one day over term, not in labor. In view of the dystocia, the infant death, and the puerperal complications of the other labor, cesarean section was done June 25, by the classical incision. The child was alive, female, and weighed 7¼ pounds. The mother had an uneventful puerperium, and was discharged August 9, much happier than one year before. She and her baby are in good health at the present time.

CASE 2.—Mrs. M. P., first appeared in the prenatal clinic October 29, 1926. She was at that time thirty-three years old, para iv. She was in an accident on July 19, 1926, when three months pregnant, sustaining a broken pelvis, ribs, and shoulder. She delivered spontaneously on Dec. 31, 1926. She returned May 24, 1929, at this time para v. Measurements were normal. X-ray revealed an old fracture of the right ischium, good position. This pregnancy also terminated in a spontaneous delivery, no complications ensuing.

These cases demonstrate that fracture of the pelvis in the female may or may not constitute an obstetric complication, depending on the extent of the injury, location of the fracture, amount of callus formation, etc. On the basis of my experience with this complication, limited though it may be, yet I cannot agree with the statement of Williams, that "in such cases the internal injuries are usually so severe as to lead to the death of the patient, so that only a small proportion of such women survive, and very few become pregnant." We must not overlook the important observations made by Noland and Conwell that female pelves are fractured more easily than male; which may account for the fact that women do survive these injuries and do become pregnant subsequently. Internal injury, therefore, does not follow every fracture of a female pelvis.

I am reporting these cases because of the paucity of literature on the subject of fractured pelvis complicating pregnancy and labor, and because of the apparent increase in the number of cases coming to our attention due to the accidents of modern traffic and industry. I make it a routine in taking obstetric histories to ask the patient if she has ever been run over or injured about the pelvis in any way, and if there is a positive history, an x-ray of the pelvis is taken in the prenatal period as well as postpartum.

Since the preparation of this paper, there has been reported a case of fractured pelvis by Ward L. Ekas, of Rochester, N. Y. (AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, May, 1931). The deformity of the pelvis in his case resembles very much that reported here (Case 1), but his case terminated spontaneously without complications. Ekas' case and those reported here are apparently the only ones to be found in contemporary medical publications of this country.

2340 EUTAW PLACE.

(For discussion, see page 141.)

CARCINOMA DEVELOPING IN A MYOMATOUS UTERUS AFTER X-RAY MENOPAUSE*

By Catharine Macfarlane, M.D., F.A.C.S., Philadelphia, Pa.

AN unfamiliar factor, the development of carcinoma many years after x-ray treatment, was illustrated by a case under my care during the past year which seems of considerable significance and worth reporting.

Alice T., married, white, sixty years of age, was admitted to the Woman's Hospital on January 7, 1930 complaining of a more or less constant, blood-stained vaginal discharge of seven months' duration.

In 1914, when forty-four years old, she consulted her physician on account of profuse periods and was told she had a tumor the size of "a half loaf of bread." Operation was advised but refused. Her periods were checked by a series of x-ray treatments given by Dr. George E. Pfahler.

Fifteen years later (June, 1929) after a fall, she noticed a slight, blood-stained, vaginal discharge and was brought to me by her physician, Dr. Ellen E. Brown, of Chester.

I found the abdominal wall densely infiltrated as a result of the x-ray treatment and the overlying skin scaly and of a purplish pink color. Pelvic examination showed an irregularly nodular, movable uterus reaching halfway to the umbilicus. Inspection of the cervix showed a moderate degree of endocervicitis which seemed sufficient to account for the slight blood-stained discharge.

This discharge continued and in September, 1929, during my absence from the city, the patient consulted Dr. Pfahler who curetted her without anesthesia, obtained a negative report on the scrapings and made an intrauterine application of radium.

The blood-stained discharge still continued and in January, 1930, the patient was again brought to me. A curettage was performed under ether with the greatest difficulty because of the distortion of the uterine cavity caused by a large submucous nodule projecting into it. Scanty insignificant scrapings were obtained and 75 mg. of radium were placed in the uterine cavity for twenty-four hours. A few days later, Dr. Berta M. Meine reported the presence of adenocarcinoma in the scrapings. Two weeks later I performed an abdominal panhysterectomy with removal of both ovaries and tubes.

There were no adhesions. The broad ligaments were free. The uterus reached to within two inches of the umbilicus, it presented several subperitoneal nodules 4 or 5 cm. in diameter, and was delivered with considerable difficulty owing to the rigid infiltration of the abdominal wall. Upon opening the uterus a submucous nodule about 5 cm. in diameter, was found just above the internal os. The endometrium opposite this nodule, about two and a half cm. above the internal os, presented a roughened area. Sections from this area showed adenocarcinoma.

The patient stood the operation well. In spite of the induration of the abdominal wall, the incision healed by first intention, within a few weeks, however, a dense infiltration appeared in the vaginal vault. This steadily increased. It eventually surrounded the rectum causing complete obstruction for which a co-

*Read before the Obstetrical Society of Philadelphia, March 5, 1931.

lostomy was performed by Dr. John B. Carnett. About three months after the panhysterectomy the patient died. There was no autopsy.

While the conduct of this case presents several points which are open to criticism and which might be discussed with profit, the fact to which I wish to call attention is the development of carcinoma in this myomatous uterus fifteen years after x-ray castration. I had never seen nor heard of a similar case.

On reviewing the literature of the past sixteen years, I found only seven articles dealing with this subject. All of these articles were in the German literature.

In these seven articles, 29 cases were reported. Eighteen followed radiation treatment of uterine myomas. Eleven followed similar treatment for climacteric bleeding without pelvic pathology.

Of the 18 myomas, only four had been curetted previous to radiation, in these the microscopic findings were negative. Sixteen had been treated by the x-ray alone, two by x-ray and radium. In one case bleeding returned after six months; in one, after six years; the average time of return was three years. In ten cases adenocarcinoma developed in the body of the uterus; in one case, in the cervix; in 7 cases, squamous celled epithelioma developed on the vaginal portion of the cervix. In the final treatment of these cases, radium was used four times; x-ray once; radical operation eleven times.

Of the 11 cases of climacteric bleeding, 5 had been curetted previous to radiation with negative microscopic findings. Seven had been treated by x-ray, one by radium, three by radium and x-ray. In one case bleeding returned after two months (had not been curetted); in two, after five years; the average time of return was three years. In five cases, adenocarcinoma developed in the body; in 4, in the cervix; in 2 cases, squamous celled epithelioma developed on the vaginal portion of the cervix. The final treatment of 8 of these cases was radical operation, the final treatment of the remaining 3 was not mentioned.

The development of carcinoma in the uterus after radiation is evidently exceedingly rare. Werner of Vienna, on the basis of 2,680 patients treated by radium or x-rays for myomas or climacteric bleeding, reported an incidence of 0.3 per cent, Vogt of Tuebingen, on the basis of 1,300 similar cases reported an incidence of 0.4 per cent. Since carcinoma of the uterus occurs in approximately 5 per cent of all gynecologic cases and in only 0.3 per cent to 0.4 per cent of radiated cases, radiation obviously affords a distinct protection against its development.

In one-half of the cases reviewed in this paper, carcinoma developed in the uterine body; in the other half, in the uterine cervix. The only sure means of preventing its occurrence would be the routine performance of panhysterectomy in all patients with myomatous tumors or climacteric bleeding. Since panhysterectomy in its turn is attended

by a certain percentage of mortality and morbidity this operation cannot be recommended indiscriminately for every case.

From our own experience and from this review of the scanty literature of the subject, it is evident that the possibility of carcinoma developing in the uterus after radium or x-ray treatment is very remote. This possibility does not contraindicate radium or x-ray treatment of myomatous tumors or climacteric bleeding. It does add one more factor to the list to be considered when deciding upon the best method of treating the individual patient.

CONCLUSIONS

1. Carcinoma may develop in the uterus after x-ray or radium menopause.

8. Bleeding from the uterus after the menopause, natural or artificial, must be attributed to carcinoma until proved to the contrary by the microscope.

3. Persistent bleeding from the uterine cavity after radiation treatment indicates radical operation in spite of negative findings on diagnostic curettage.

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701 MEDICAL ARTS BUILDING.

(For discussion, see page 133.)

Finger, J.: Therapeutic Tests with Cholesterin in Septic Diseases. Monatschr. f. Geburtsh. u. Gynäk. **87:** 94, 1931.

At the beginning of every acute infection there is a distinct diminution in the cholesterin contents of the blood. If the infection is being successfully combated, the amount of cholesterin increases. Reitzenstein fed rats a diet poor in cholesterin and thereby diminished their resistance against external infection. In human beings cholesterin is toxic, hence it must be used with great caution. The author treated 37 women who had infections by means of intravenous injections of cholesterin. Altogether 264 injections were given. In many cases there were pulmonary manifestations of an embolic nature. Five of the 37 patients died. The author feels that cholesterin helps build up resistance against infection even though the mechanism involved is not understood.

J. P. GREENHILL.

SYPHILIS OF THE FETUS AND NEWBORN INFANT*

By Fred L. Adair, M.D., Chicago, Ill.

(From the Department of Obstetrics and Gynecology of the University of Chicago)

SYPHILIS, which is a preventable disease, is still a frequent cause of morbidity and mortality among fetuses and infants. It can be successfully treated only prior to birth. If the condition could be recognized and treated in the parents prior to conception, and failing there, in the mother during pregnancy, the occurrence of this infection in the fetus and the newborn infant could be practically eliminated.

Its frequency, as a cause of disease and death of the fetus and newborn infant, varies greatly in different localities and in various racial groups. The greater attention given to prenatal care and to the prevention and cure of venereal disease has undoubtedly reduced its incidence during the past decade or two.

The eradication of this contagious disease is a problem common to all localities and all countries; there is only the difference in its incidence. The statistics for the different countries are not all given on the same basis so that a comparison is difficult. In a tabulation of stillbirths by the Census Bureau for a selected area (1924), 2.6 per cent were attributed to syphilis.

This does not correspond closely with various series of stillbirths which have been reported on the basis of postmortem study. Varying figures are given from less than 1 per cent to over 40 per cent. Other series are published which give the frequency during pregnancy.

In Brooklyn, New York, Beck reported 1,000 consecutive deliveries prior to 1921 with 3 per cent maternal syphilis. Gebhart found in New York City 23.3 per cent of syphilities among 1,224 colored pregnant women during the period from 1917 to 1923. Parker found 8.3 per cent in 6,300 prenatal cases. Stillians reported from the Chicago Lying-in Hospital (1917-1928) 6,954 pregnant women, mostly white, with an incidence of 6 per cent, 814 negroes with a percentage of 19.2 and a general average of 7.4 per cent syphilitic. Wilson reported an incidence of 7.5 per cent in 3,631 colored women in Chicago and noted a gradual decline from 15.1 per cent in 1920 to 4.7 per cent in 1927.

Pomeroy in Los Angeles reported 8.1 per cent among 817 Mexican and Japanese women. Sage reported 5.5 per cent in 1,200 pregnant women and 23.8 per cent among 118 stillborn infants. Williams in an earlier series of 4,000 pregnant women (1916-1919) found 11.2 per cent syphilitic, 2.48 per cent among the whites and 16.29 per cent among the colored. In 302 fetal and neonatal deaths 34.4 per cent were due to syphilis.

In Detroit, prior to 1926, among 4,120 white and colored prenatal cases 13.7 per cent were syphilitic. In the prenatal clinic of Birmingham, Alabama, during

*Read before the Chicago Gynecological Society, March 20, 1931.

1928 and 1929 there were 735 white and colored women of whom 22.3 were syphilitic (white 8.7 per cent and colored 24.8 per cent).

McCord reports similar percentages from Atlanta and believes that at least 45 per cent of the stillbirths and the neonatal deaths were due to syphilis.

Similar conditions prevail in Europe. Dodds in Edinburgh found 6.5 per cent syphilitic in 2,000 consecutive cases of pregnancy. Gammeltoft in Denmark found 5.5 per cent of 23,383 pregnant women with evidence of syphilis. Cruikshank in 1920-21 studied 1,881 prenatal cases among which 9.04 per cent were syphilitic, and in 1930 he reported that there had been a reduction in the incidence of syphilis and that syphilis caused less than 1 per cent of the stillbirths.

The transmission of the disease is now generally accepted as being maternal though a few cases in the literature strongly suggest paternal transmission.

The effect on the fetus depends undoubtedly on the virulence of the infection and the resistance of the mother. The older the disease in the mother the less the effect on the fetus. The more adequate the treatment in the mother the less the risk to the fetus.

It is difficult to know whether the toxins may affect the fetus without actual invasion of the fetus with the spirochetes. Usually the organisms can be demonstrated in a fetus recognized as being syphilitic. Not every child of a syphilitic mother is syphilitic. Treatment of the mother in so far as the fetus is concerned is most effective if begun prior to conception. It should be continued during pregnancy. Gammeltoft from a series of 1,290 syphilitic women delivered in the University Clinic at Copenhagen considered that every syphilitic woman should be treated during pregnancy with salvarsan, mercury, or bismuth with no regard to date of initial infection, to previous treatment, or to the presence of a negative Wassermann. In 545 cases, where the infant was followed for half a year or more, he found that of 201 untreated cases there were only 7 nonsyphilitic infants; of 87 mothers treated with mercury only prior to pregnancy there were 9 without syphilis; of 15 treated with salvarsan only prior to pregnancy there were 3 infants without syphilis; of 111 treated with mercury during pregnancy 79 were nonsyphilitic; while with salvarsan treatment before and mercury during pregnancy 19 of 26 were not syphilitic; only 7 were treated with salvarsan before and during pregnancy with 6 infants which were not syphilitic. The best results were obtained with salvarsan before and during pregnancy. It must be used cautiously and discontinued in case albuminuria occurs. The transmission is through the placenta and usually does not occur prior to the fourth or fifth month.

McCord found over 33 per cent of his untreated pregnant syphilitic women had premature or full-term stillbirths as compared with 9 per cent for his treated cases. Many born at term or prematurely did not survive.

In a series of something over 1,000 autopsies on fetuses and newborn infants performed at the University of Minnesota Hospital there were about 46 syphilitic infants, a percentage of 4.4. This included stillborn and newborn infants only.

The diagnosis was made upon the presence of one or more of the following conditions: positive maternal Wassermann, the presence of spirochetes, typical epiphyseal changes, characteristic skin changes, and characteristic changes in the viscera, as the spleen, liver, lung and pancreas.

The maternal Wassermann was positive in 28 cases, not done in 6 and negative in 12. Syphilis was not previously diagnosed in the mother in 31 cases and only 3 women had received any treatment, one before pregnancy, one had a single treatment during pregnancy, and a third had treatment throughout pregnancy.

In our entire series there were 501 stillbirths of which 37 or 7.4 per cent were syphilitic; i.e., 80.4 per cent of the syphilitic group; 27 of the 37 or 73 per cent were premature, and 10 or 27 per cent were full term; 33 died antepartum and 4 died intrapartum deaths. Only 9 were born alive, which is 1.6 per cent of the entire group of 543 living births, or 19.5 per cent of the syphilitic group; all of the 9 were premature. Of these respiration was not established in three and 6 died neonatal deaths.

In the whole group of 46 syphilitic infants, 36 or 78.2 per cent were prematurely born and 10 or 21.7 per cent were full term.

Spirochetes were found in the fetal tissues of 41. Osteochondritis syphilitica was present in 37 and was confirmed in all of the 10 cases which were subjected to x-ray diagnosis. Splenomegaly was present in 35, hypertrophy of the liver in 25, gumma of the liver in 3, pneumonia alba in 8, pancreatitis in 11, and skin changes which were characteristic in 19. In the entire series of autopsies there were 10 cases of hydrops fetalis, of which 2 were syphilitic.

Some of the organ weights of this series were plotted against fetal body weight. In these graphs the distribution of weights indicates that when the syphilitic are compared with the nonsyphilitic fetuses there are certain fairly definite differences. A comparison of the placental weights of the two groups shows that the weight of this organ is higher for the syphilitic than for the nonsyphilitic fetuses of a corresponding size. This might be expected because the placenta is usually involved with this disease as might be anticipated from the transplacental transmission. The changes in the placenta are clubbing of the villi, and proliferation of the stroma cells with endarteritis and periarteritis. The cord shows similar changes in the vessels.

The lungs are frequently, but not so constantly, involved which might be anticipated from the fact that they are nonfunctioning organs in the fetus. The weights as plotted show wide variation but

some of these are distinctly heavier and most of them showed evidence of pneumonia alba. Gumma has been described but is rare; pleural thickening has also been noted.

The more common change which is associated with the so-called pneumonia alba is that of interstitial fibrosis and desquamation of the epithelium of the alveoli.

The liver is more frequently involved and the weights are definitely higher for this organ in the syphilitic than in the nonsyphilitic fetuses. Gummas, more commonly of the miliary type, are not uncommon and they may resemble tubercles. Larger ones are less frequent. Retarded development with persistence of hematopoietic islands and embryonic liver columns occurs. Pericellular fibrosis and foci of lymphocytic and plasma cell infiltration are often present. Changes in the vessels are often found. The kidneys are generally of a greater weight in the syphilitic infants. It has been thought that there is a tendency to a persistence of the nephrogenic zone.

Foci of lymphocytic infiltration are present in the intertubular stroma and the subcapsular area. Characteristic vascular changes are also present.

The spleen is definitely enlarged and heavier. The pathologic changes which may be considered pathognomonic are difficult to discover. Hyperplasia with fibrosis is present, together with vascular changes. Gummas also occur and amyloid changes have been described.

(For discussion, see page 140.)

Nürnberger, L.: The Diagnosis of Hydatidiform Mole. Med. Klin. **27**: 343, 1931.

Nürnberger points out that the only direct evidence of the presence of a hydatidiform mole is the expulsion of vesicles. Usually the diagnosis is based upon indirect evidence such as: unusually large uterus for the corresponding period of pregnancy, abnormal contractions of the uterus, hemorrhages, absence of a fetus, albuminuria and edema. In recent years there has been added a most valuable aid, namely, the detection of an increased elimination of anterior pituitary hormone in the urine. Hence in all cases where there is a suspicion of hydatidiform mole or chorionepithelioma an Aschheim-Zondek test should be performed. If more than 50,000 mouse units are found there are most likely pathologic changes in the placenta. If 200,000 or more mouse units are found, the diagnosis of hydatid mole or chorionepithelioma can be made with certainty.

After a hydatid mole is removed, the urine should be examined at frequent intervals. If the reaction remains positive, it indicates the retention of pieces of the mole or the transition into a chorionepithelioma.

J. P. GREENHILL.

SAMUEL BARD, THE AUTHOR OF THE FIRST TEXTBOOK ON OBSTETRICS PUBLISHED IN AMERICA

By Herbert Thoms, M.D., New Haven, Conn.

A

COMPENDIUM

OF THE THEORY AND PRACTICE

OF

MIDWIFERY

CONTAINING

PRACTICAL INSTRUCTIONS FOR THE MANAGEMENT OF

WOMEN

DURING PREGNANCY, IN LABOUR AND IN CHILDBED

CALCULATED

TO CORRECT THE ERRORS AND TO IMPROVE THE PRACTICE, OF

MIDWIVES

AS WELL AS TO SERVE AS AN INTRODUCTION TO THE

STUDY OF THIS ART,

FOR

STUDENTS AND YOUNG PRACTITIONERS.

BY SAMUEL BARD, M.D.

PRESIDENT OF THE COLLEGE OF PHYSICIANS AND SURGEONS

IN THE UNIVERSITY OF THE STATE OF NEW YORK.

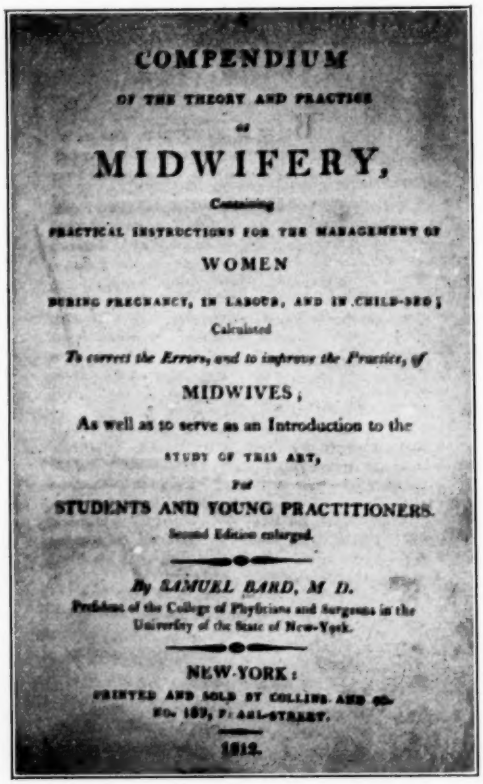
So appears the title of the first work on obstetrics written in America and published in 1807. (Fig. 1.) At a glance, it may seem strange that this small book could survive the burden of such a title page, but a look into its interior reveals not only much fine obstetric thought but depicts in a splendid manner a good deal of the life and time of its notable author. Furthermore, it will always remain an important landmark in the obstetric annals of America.

The copy which rests upon my desk is one of the "second edition enlarged" and we may believe the inscription on the flyleaf which tells of its purchase in 1817 by Asabel Thompson, M.D., for $1.10.

It will be a pleasant duty for obstetricians to familiarize themselves with something of the content and author of this book. The gems to be found within its pages are numerous and brilliant, and the present task will be to select a proper few to demonstrate the excellence of the whole.

The soundness of the author's experience is well shown in the introduction, when he writes "there is some reason to believe there is greater safety in this branch of medicine from modest unassuming ignorance, than from a meddling presumption which frequently ac-

companies a little learning.'' Lest the reader expect too much of the author's effort, he recommends the works of European writers, especially White of Manchester, Denman of London, and Baudeloque of Paris. Bard further states that he had been solicited by his friends in this new edition to include a chapter on the use of instruments. His mature reflection, however, decided against this, and he states that he wishes in the present work to ''teach the progress and management of natural labour . . . . and I will venture to assert that the better



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STUDENTS AND YOUNG PRACTITIONERS.

Second Edition enlarged.

By SAMUEL BARD, M D.

Professor of the College of Physicians and Surgeons in the University of the State of New-York.

NEW-YORK:

PRINTED AND SOLD BY COLLINS AND CO.

No. 189, PEARL-STREET.

1812.

Fig. 1.

the rules here laid down are understood, and the more steadily they are practiced; the less frequently will the necessity of applying to instruments occur.''

In the absence of present-day diagnostic refinements for the detection of preeclampsia and preeclamptic states, Bard writes of convulsions that ''they are frequently preceded by a very irritable and fretful state of mind, approaching to delirium, and by a restlessness and unaccountable uneasiness of body; by some degree of blindness, and the appearance of motes dancing before the eyes; by a swimming or violent pain of the head, especially on stooping down, by a flushed

countenance, a staring and protruded eye, swelling of the veins of the neck, and throbbing of the arteries in the head; and sometimes by a cramp, or violent pain in the stomach, which is always a dangerous symptom."

Although pelvimetry as we know it was not taught or practiced in Bard's day, still pelvic deformities were recognized, and he gives excellent directions for estimating the diagonal conjugate diameter and for recognizing contractions not only of the superior but also those of the inferior strait.

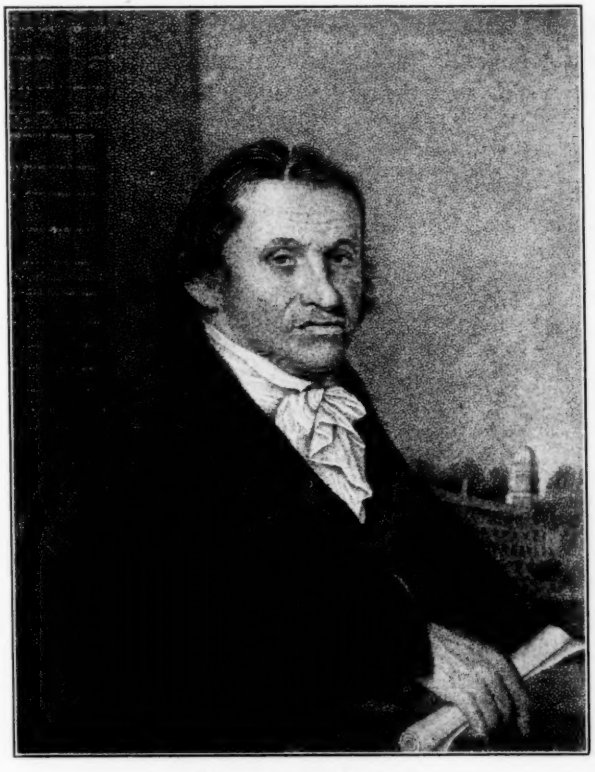

Fig. 2.—Samuel Bard.

Prolonged vaginal examination and manipulation during labor, a practice still indulged in by ignorant practitioners, was properly scored. "What terms shall I use," he writes, "to condemn as it deserves, the abominable practice of boring, scooping, and stretching the soft parts of the mother, under the preposterous idea of making room for the child to pass? It is impossible to censure this idle, indiscreet and dangerous practice too severely." Later on, this practice is again referred to, "It sometimes happens that the internal orifice of the womb is found remarkably thick and rigid, especially in women advanced in life; in such cases all the advice already given respecting

patience, quiet, delation and a cool regimen, and all the cautions respecting improper interference of the midwife, in attempts to stretch and dilate the parts are more particularly necessary, on account of the importance of the part itself, its extreme sensibility, and the great danger of inflaming it. . . . ."

Bard's sound conception of contracted pelves and their relation to successful labor is seen in his discussion of rickets. He writes, "Nor is it only by injuring the shape of the bones, that mismanagement in childhood unfits women for easy childbearing, but by preventing firmness and vigour in general, and occasioning a weak feeble and irritable habit. A sedentary life and luxurious education, are the chief causes of all the evils which women suffer during pregnancy and labour. Keep children therefore out of doors, in constant exercise; allow them a full but plain and simple diet; and when grown up to young women, let them live more agreeably to nature, let them avoid late hours and crowded rooms, indulgence in soft beds, and luxurious diet; let them walk, ride and dance." If sounder doctrines than these exist in the present Year of Grace, I am unfamiliar with them.

Examples of obstetric erudition abound in this small book of Samuel Bard, and the reader will not be disappointed in a careful perusal of his work.

The author of America's first work on obstetrics was an illustrious son of an illustrious father, Dr. John Bard, who is known to us as a famous New York physician, an intimate of Franklin and Washington and the first observer in the New World to report a case of extrauterine pregnancy. Ford has given us a pen portrait of him in his recent *Washington and His Associates.* He writes, "Dr. John Bard, the fashionable doctor of his day, who attended Washington through the severe illness which laid him up for six weeks early in his administration, habitually wore a cocked hat and a scarlet coat, his hands resting upon a massive cane as he drove about in a pony phaeton."

Samuel Bard was born in Philadelphia, April 1, 1742. Four years later the family removed to New York City, where his father had been urged to establish himself by Benjamin Franklin. Here, after attending grammar school, Samuel Bard entered King's College at fourteen years. While still pursuing his classical studies, his attention was turned to medical subjects, and he also studied with his father.

At the completion of his collegiate course, it was decided that he should go to Edinburgh for his degree. At that time, the two great centers of medical learning were Leyden and Edinburgh, and in the latter place Cullen and his associates were rapidly placing the school in the foremost position. In September, 1761, Bard embarked from New York only to be captured three weeks later by a French privateer. England and France were then at war, and as a prisoner of war

he was confined five months in a castle at Bayonne. Fortunately, his father's friend, Franklin, was residing in London and was able to obtain his release.

He at once proceeded to London where, at the recommendation of Fothergill, he went to St. Thomas' Hospital as assistant to Alexander Russell. After six months, he left for Edinburgh and placed himself under the galaxy of talent that then flourished in that city. Robertson, the historian, was at the head of the university and Rutherford, Whyte, the two Munros, Cullen, Hope, Ferguson, Gregory and Blair were among its teachers. Cullen particularly delighted young Bard, who declared he could "listen to him for three hours instead of one."

It is interesting to read a record of a medical student's activities at that time. Samuel Bard in a letter has preserved for us such a document. "My day in general," he writes, "is thus spent; from seven to half after ten I am present employed in the mathematics, which will soon however be changed for professional reading and the examination of my notes; then dress and am by eleven at College, attending Professor Ferguson until twelve; from that hour until one at the hospital, from one till two with Dr. Cullen, from two to three I allow to dinner, from three to four with Munro in anatomy, from four to five or half an hour after I generally spend at my flute and taking tea either at a friend's room or with a friend in my own; after this I retire to my study and spend from that time until eleven o'clock in correcting my notes and in general reading." Another letter which surely gratified his father reads, "Last week, the judges for the annual medal given by the professor of botany of this University, examined the hortus siccus of the candidates and I have the pleasure to acquaint you decided in my favor."

Samuel Bard graduated from Edinburgh in 1765, after having defended and published his thesis "de viribus opii." From Edinburgh he went to London, remaining ten months before embarking for his native land.

One or two facts concerning medical education are pertinent. Bard's education abroad had cost his father over one thousand pounds, and although there were said to be about 3,500 physicians all told in the American Colonies at that time, probably less than 400 had medical degrees. Samuel Bard therefore received what was, for that time, a luxurious education.

Morgan, Shippen and their associates in Philadelphia had from the first interested Samuel Bard. While a student in Europe, he had written to his father concerning the establishment of a medical school in New York. Within a year after his return, an organization was effected and united to King's College. His associates were Clossy, Jones, Middleton, Smith and Tennant. Bard himself was chosen to the chair of Theory and Practice of Physic. He was then in his

twenty-eighth year. Medical degrees were first conferred by this school in 1769.

When the trustees of Columbia College annexed the faculty of physic to that institution in 1792, Dr. Bard was continued as Professor of the Theory and Practice of Medicine and was appointed dean of the faculty. The establishment of the City Library and the New York Dispensary was chiefly due to his efforts.

In 1795, Bard took David Hosack into partnership and three years later he relinquished his practice in New York and removed to Hyde Park, New Jersey. His retirement could not be said to be complete, however, for at various times he resumed for short periods his practice in the city, especially when Hosack was absent from town. Soon after Dr. Bard became a resident in the country, his love of agricultural pursuits led him to form a county society devoted to those interests and he was elected its first president. At a later date, when Colonel Humphreys became interested in the introduction of merino sheep into the United States, Bard entered into that speculation and even published a book, *The Shepherd's Guide*, dealing with the difficulties of sheep raising. Shortly after retiring into the country, Samuel Bard contemplated the publication of a treatise on obstetrics. His reputation as an accoucheur had been preeminent, and it was a subject which interested him perhaps more than any other branch of medicine. In the year 1807 appeared the first of the five editions of this work. Other subjects which were well served from his pen were "Yellow Fever," in the Transactions of the College of Physicians in Philadelphia, and "Medical Education," New York, 1819. As evidence of his interest in community life, he practically founded the Church of St. James at Hyde Park in 1811. In 1816, Princeton College conferred upon him the honorary degree of Doctor of Laws. Dr. Bard was a profoundly religious individual, and his letters, many of which survive, show much evidence of this part of his character. Samuel Bard died on the twenty-fifth of May, 1821, at the age of seventy-nine. His death occurred within twenty-four hours of that of his wife, with whom he had lived fifty-six years. In a brief survey of the life of Samuel Bard, one is impressed with its great usefulness. In whatever field his interest turned, this interest was deep and thorough, and he was not satisfied until he actually contributed to the welfare of that pursuit.

Among his notable medical contributions should be mentioned his essay on "Diphtheria in skin, mucous membrane and larynx," the importance of which publication has been emphasized by Dr. Abraham Jacobi. His experiments in horticulture and his contributions to that subject are noteworthy. In the field of obstetrics, however, he will always be remembered not alone because of his authorship of the first book

in America on that subject, but because that publication was a greatly influential and noteworthy undertaking.

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Let Nature take her time, why hurry? There is no rapid transit road in the proper practice of obstetrics. These are the paramount sentences in this concise summary of obstetrics.

In eclampsia no forcible dilatation of the cervix, followed by version and extraction, with the usual death of the child and the endangering of the life of the mother, but conservative, proper use of morphine and chloral hydrate to control convulsions which often will obviate cesarean section or other extreme measures.

Pituitrin injections with artificial rupture of membranes result in many unnecessary stillbirths, intracranial hemorrhages of the newborn and occasionally a ruptured uterus.

High forceps deliveries should be relegated to the Dark Ages. Mid forceps deliveries only ought to be used when there is fetal distress. Nature, otherwise given a chance will mould the head and soften the parts for a normal delivery. Morphine and rest are proper procedures for atony of the uterus and maternal exhaustion. The brutal so-called prophylactic forceps has increased the stillbirths and the maternal morbidity.

Version and extraction are proper only in transverse presentation, prolapsed cord, and partial placenta previa with a fully dilated cervix.

Occipitoposterior presentation has created too much fright among obstetricians with its resultant operation or instrumental delivery. Time and patience will here accomplish better results without interference. In rare cases where there is fetal distress the Kielland forceps should be used.

Breech or podalic presentation has tempted too many obstetricians to do something. The delivery should not be interfered with until the breech has spontaneously come through the vulvar orifice. Then and only then, the obstetrician is to render "manual help" for the delivery of the upper extremities and the aftercoming head.

In the case of twins, the delivery of the second baby is usually rushed along in a most rapid manner. Why hurry?

Third state of labor with many physicians assumes the character of a rapid dismissal stage. Most of the placentas are expelled spontaneously after separation from the uterine wall. Should it, however, not be expelled though separated, as evidenced by the rising of the well contracted uterus above the umbilicus, then and only then is the proper time to help the expulsion.

WM. C. HENSKE.

Society Transactions

THE AMERICAN GYNECOLOGICAL SOCIETY

FIFTY-SIXTH ANNUAL MEETING

Hot Springs, Va.

MAY 18, 19, AND 20, 1931

(Concluding Installment)

14. **The Results of the Rabbit Ovulation Test in the Diagnosis of Pregnancy,** by Drs. Karl M. Wilson and George W. Corner, (by invitation), Rochester, N. Y. (See page 513, October, 1931, issue.)

DISCUSSION

DR. MAXWELL LAPHAM, PHILADELPHIA, PA.—The technic advocated is a definite improvement over that of the Aschheim-Zondek test, both in its simplicity and ease of reading the results. It is not a highly specialized laboratory test because the reaction is macroscopic in every case.

Although Dr. Wilson has had very good results with the technic of injecting only 5 c.c. of urine and operating upon the rabbit at the end of twelve to eighteen hours, we believe that there are certain to be errors in this technic especially in a case of early pregnancy when there will not be a great quantity of the hormone and the rabbit may not react to so small an amount. We must also bear in mind that all rabbits do not ovulate in twelve hours, so that the very earliest time a rabbit should be examined would be twenty-four hours after the injection.

If, for any reason, an emergency arises such as a suspected ectopic pregnancy, two rabbits may be injected at the same time, killing one at the end of eighteen hours. If the reaction is positive, one may proceed with the treatment of the patient. However, if the first rabbit gives a negative result, the second rabbit injected for forty-eight hours can be carried along and no time is wasted in getting a true reading.

I had a very interesting case about two months ago, of a woman who came to the clinic with the uterus the size of a four months' pregnancy but who had only missed two periods. She was bleeding quite profusely at the time of admission. I carried out a pregnancy test which was positive, and because of the symptoms an evacuation of the uterus was done. The laboratory findings confirmed the diagnosis of hydatid mole. She remained in the hospital ten days, at the end of which time bleeding had stopped and the uterus had involuted fairly well. At the end of a second ten days she came back with the symptom of bleeding again. A second pregnancy test was done, and found to be still positive. A second curettage was done and a pathologic diagnosis of chorionepithelioma was made. A panhysterectomy was then done and I am about to do a third pregnancy test to see if there has been any metastasis. In such cases this test seems to be an extremely valuable one.

DR. WILLIAM A. SCOTT, TORONTO, CANADA.—The economic factor was the one that deterred us from adopting the rabbit as a routine method. We use five mice which cost approximately twenty-five cents apiece. Rabbits would cost approximately $1.50. They have to be isolated for five or six weeks during which time

they are fed, and they eat considerably more than mice, so that the cost of the service to the hospital is going to be considerably more using rabbis as a routine. In those cases where a rapid result is desired we would feel that the urgency would demand that we use more than one rabbit because of the possibility of the toxicity of the urine. It is true that rabbits are not so susceptible as mice because on two occasions at least we have had the whole batch of mice killed by a urine that was toxic, but with the present technic we do not encounter that difficulty so often.

We are using the original test and are quite satisfied with it. Dr. Wilson spoke of its value in hydatid mole. A young woman in her first pregnancy last August had a hydatid mole removed at another hospital and then came to our hospital and was curetted. There were some remains of the mole and it was not suspicious of malignancy. She went from November to March with a history of having bled once every week during the interval. There was an enlarged, soft, retroverted uterus and we were highly suspicious of malignancy. A negative Aschheim-Zondek test relieved our minds and the symptoms ceased after another curettage and correction of the retroversion. In those cases where we suspect chorionepithelioma not only do we do the ordinary test but are also doing the test with highly diluted urine, possibly running several batches through and diluting the urine more with each batch. I can see that the rabbit test would be more useful than an ordinary mouse test after pregnancy is terminated because a negative result is obtained at the end of twenty-six to twenty-eight hours. With mice it is between two and three times that maximum length of time. It might be of value especially in a differentiation between a complete and an incomplete abortion.

DR. WILLIAM C. DANFORTH, EVANSTON, ILL.—The application of the modified Aschheim-Zondek Test in 400 consecutive cases at our hospital has demonstrated its value as a practical diagnostic procedure with an accuracy of 98.6 per cent. The original technic has been changed in the following manner with the view of increasing the simplicity and accuracy of the test:

(1) The use of one female rabbit eighteen to twenty weeks of age; (2) restriction of fluids twelve hours preceding the test; (3) filtration of each specimen of urine; (4) one intravenous injection of 12 to 14 c.c. of urine; (5) autopsy at forty to forty-eight hours.

The accuracy of the test depends to a great extent upon its limitations. A number of the cases represented in the present series indicate rather definitely that the hormone upon which the test is dependent, appears in the urine approximately three weeks following the intercourse responsible for the pregnancy. In view of this fact, it has been found possible to obtain a positive reaction in some instances even before a menstrual period has been missed.

In several other instances negative reactions have been obtained as much as five days following a missed period, even though the patient has shown by later tests to be pregnant. This demonstrates the necessity of a careful consideration of the history in each instance, and repetition of the test in cases where the above possibility exists. In other words, these facts indicate that when the pregnancy occurs immediately following a menstrual period a positive reaction may be obtained prior to the date at which the next menstrual period should appear, while if the pregnancy occurs immediately preceding a menstrual period, the reaction may not appear until a week or two following the missed period.

In the case of abortion, missed abortion, ruptured ectopic pregnancy, hydatidiform mole and chorionepithelioma, a careful consideration of the history and clinical findings is absolutely necessary for a correct interpretation of the result of the test, and lack of their consideration may lead to serious error.

It has been found that following complete evacuation of the uterus, the reaction may disappear within twenty-four hours. With incomplete evacuation of the uterus,

as in incomplete abortion, missed abortion, and ruptured ectopic pregnancy, the reaction may persist as long as a month, providing circulatory contact is maintained. On the other hand, it has been demonstrated that in the case of incomplete or missed abortion, placental tissue and even the fetus may be retained four to six weeks after the reaction has disappeared.

DR. ARTHUR H. CURTIS, CHICAGO, ILL.—The influence of living fetal tissues upon the maternal organism, in the presence of a dead fetus or when a fetus has been passed, is of interest not only in connection with a positive Aschheim-Zondek test but in some other respects. I saw rather recently a patient who had passed a hydatid mole two years ago. There had been no subsequent pregnancy. The patient was in the hands of another doctor; tests were made. At the time of passage of the mole a study of curetted material and of the fetal tissues failed to reveal a malignancy, but suddenly, shortly before consulting with me, she developed unmistakable signs of chorionepithelioma. It was an excellent opportunity for me to search for those evidences of pregnancy which might be ascribable to fetal tissues other than a fetus. This patient exhibited the best developed positive Hegar sign I have ever encountered. The patient died two weeks later, without operation. The necropsy revealed generalized chorionepithlioma, and again a strongly positive Hegar sign was evident.

DR. N. SPROAT HEANEY, CHICAGO, ILL.—During the last four years the department of pathology at the Presbyterian Hospital has been very much interested in operations upon rabbits, particularly through the work of Allen in grafting endometrium and ovarian tissue into the eye. Through this experience we have learned that in spite of precautions one may meet with pitfalls in any test which requires certification as to the genital condition of the rabbit. You have noticed in the discussions many conditions which must be fulfilled before dependence can be placed upon this test. Priest, working in our laboratory, has modified this test in a very important way. A rabbit of any age over eighteen to twenty weeks is used for the test. Before giving the suspect urine, the rabbit is operated upon and the condition of the genitalia definitely established. Both surfaces of each ovary are sketched, indicating any ripening or atretic follicles which may be present. The suspect urine is then given to the rabbit through an ear vein and the rabbit is then operated upon for a second time in from eighteen to twenty-four hours. Priest, by almost hourly observations, has determined that ovulation, if it occurs, will be complete in eighteen hours. It is, therefore, not necessary to wait longer than this to determine the result. As the result depends upon the quantity of hormone present in the urine even slight changes are important. By making a sketch before the rabbit is tested these slight changes may be noted. In a recent case consent to operation in a suspected case of ectopic pregnancy was obtained by getting a positive rabbit test twenty-four hours after the patient entered the hospital, when, if the Aschheim-Zondek test had been depended upon, consent could not have been obtained until after the tube had probably ruptured.

DR. FREDERICK J. TAUSSIG, ST. LOUIS, MO.—Dr. Heaney's illustration of a case in which speed of diagnosis was necessary is certainly an exceptional one and Dr. Scott's remarks were very much to the point along that line. Dr. Wilson's work is very interesting but it is still experimental. We have not as yet enough cases really to estimate the accuracy of this test, whereas the original Aschheim-Zondek test made with mice has been done so many thousands of times that we really have it as a basis for reliable laboratory report. The fact that in this mouse test five or six animals are used, and while some may be negative, a single positive establishes the diagnosis, indicates the great advantage of multiple animals for this test.

In regard to missed abortions, I have two cases in which I found the test of great value. The report came back first positive, then two or three weeks later was negative, enabling me to make the diagnosis of fetal death relatively early. These cases present considerable diagnostic difficulty. The sooner the patient knows there is no further hope for the continuation of pregnancy the better for her.

DR. FRED L. ADAIR, CHICAGO, ILL.—I have tried mice at first and found a considerable mortality, then began to use young rats. At first we used immature female rats, with the subcutaneous injection, and then intraperitoneal injections. We have also used the male rats, usually one for control and two for the injection. The results compared quite closely in both male and female. We seemed to get equal accuracy, as far as the negative and positive results were concerned, in both sexes, which is of considerable advantage, because you can use both of them from the colony.

One other point I would like to make. It has been stated that the results are 100 per cent accurate. We have not found it quite so conclusive inasmuch as we have at least two cases with an error, one case in which we got a positive test and could find no evidence of pregnancy and have as yet found none; and the other in a woman in early pregnancy for whom we had three negative tests and ultimately a positive test. I think we should bear in mind the possibility of error in a crucial case.

DR. OTTO H. SCHWARZ, ST. LOUIS, MO.—Dr. Brown, on my service in St. Louis, has been using rabbits for his tests and he has used serum intravenously, about 3½ c.c. He observes the rabbits between thirty-six and forty hours feeling that the reaction at that time is most striking. His results are entirely comparable to those presented by Dr. Wilson.

DR. DOUGLAS P. MURPHY, PHILADELPHIA.—At the University of Pennsylvania we are using the Friedman test for pregnancy in a study of the amount of sex hormone which is to be found in the urine of women who give birth prematurely. We believe that information upon this point may throw some light upon the cause of premature birth, not explainable upon other grounds.

Adult female rabbits, which are in heat are employed. To secure this condition the animal is allowed to have a litter, which is immediately removed. The animal is injected with an alcoholic extract of the urine of the patient. Using this method it has been found possible to secure a positive test, by the use of as small a dose of extract as ⅛ of a c.c. The latter is made up to represent ¼ of a c.c. of the patient's urine. Within twenty-four hours of the time of injection the result can be known. If the test is positive, inspection of the ovary will reveal a point of rupture upon the surface of one or more of the follicles, at which point ovulation has taken place. Using this technic it is possible to carry out the test, by employing only a small amount of material, and the result can be learned very soon after the injection has been made. From all standpoints it appears to be a very satisfactory method of carrying on the test.

DR. FRANK W. LYNCH, SAN FRANCISCO, CAL.—Eberson, in the University of California, for some time has been working on a modification of the Aschheim-Zondek test in rats. Instead of using 1 or 2 c.c. of urine, he uses 8 ounces or more, and extracts the hormones from the entire amount with alcohol. This residue is injected into two rats and the test is completed inside of forty-eight hours. His series is now more than 200 cases and shows an extremely high percentage of positive cases. Elsewhere he has printed a preliminary report. We have been trying to have him limit his tests to very early cases to aid in the earliest diagnoses, in which group he appears to be extremely successful. The method as I see it has

only the objection that it uses large amounts of alcohol although I understand this can be recovered by redistilling.

DR. WILSON (closing).—In our own series we had two negative reactions in early pregnancies which later became positive. It might be of value to inject two rabbits at the same time, giving one perhaps a larger dose and waiting a longer time before exploring it. When the first is explored, if positive you have your answer, no harm is done and the other animal is not needed. In the presence of a negative reaction in the first one, the second one either confirms or denies it when explored later (twenty-four hours).

As far as the Aschheim-Zondek reaction is concerned, many thousands of observations have been made and I think its value has been very well assessed. I think the time necessary for obtaining an answer is the chief objection. As Dr. Scott pointed out, there are other conditions too in which a positive reaction may be obtained. This procedure also is not 100 per cent accurate. That is obvious. We have not as yet had the opportunity to observe some of these other conditions mentioned by Dr. Scott but, after all, of course our series is small. The sum total of all the series published on this procedure are not as yet enough to fully assess its value but we have found it reasonably accurate, practically speaking about 97 per cent accurate, and its great advantage, of course, is the short time necessary for the reading of the test.

I was interested in hearing those observations on chorionepithelioma. Our case of hydatidiform mole we thought might be one and it did indicate, of course, that there had been small fragments left behind, not sufficient to give a positive reading at first, but which developed to some extent and in which the reaction did become positive afterward. We found fetal tissue microscopically, but not a chorionepithelioma.

With regard to economy, I did not emphasize this as an economical procedure at all. You must keep the animal isolated for at least a month before using. To do one test would be a very expensive matter. If you would like to know the cost, we estimate in mass production, so to speak, that each test costs about $5.00, so it does require a little financial consideration if you are going to do a large number of them.

15. **The Morphology of Menstrual Blood and Its Diagnostic Value,** by Dr. Samuel H. Geist, New York, N. Y. (For original article see page 532, October, 1931, issue.)

DISCUSSION

DR. CAREY CULBERTSON, CHICAGO, ILL.—The points in Dr. Geist's remarks that might be emphasized are first of all, the question of secretory activity shown in the epithelial cells. I would expect by high power examination of these cells to find some evidences of that still present in the débris on the first day of menstruation.

Another point is the presence of the vaginal epithelium in this material. It is a question in my mind how much that gives evidence of menstrual blood. There are so many other factors that are continually present to bring about exfoliation, such as ordinary leucorrhea. Finally I regard it as altogether misleading, to say that a bit of discharged tissue from the uterus is decidua. I am satisfied that there is relatively little difference between decidua menstrualis and decidua gestations. I would hesitate very much to say that a given piece of tissue represented pregnant decidua and not merely pregravid decidua. In other words, I think we should still adhere in the diagnosis of pregnancy to the finding of fetal elements.

DR. EMIL NOVAK, BALTIMORE, MD.—Dr. Geist's study is apparently based on the premise, which I think is justified, that the only condition in which we find desquamation of the endometrium is normal menstruation, excluding of course the destructive changes like cancer, with which we are not concerned at present. As a diagnostic procedure his method must, of course, have a limited field of application, as he doubtless himself feels. From a differential standpoint the finding of small bits of desquamated tissue may give us a clue to the intrauterine condition, but a far more comprehensive idea can be commonly obtained by a simple diagnostic curettage. The latter is, of course, an operative procedure, but a very simple one and the knowledge which it yields, when indicated, justifies its employment.

In the interpretation of desquamated material we must, of course, exercise the same care that we would in the interpretation of material obtained by curetting. For example, the findings of a quiescent type of endometrium would not by any means rule out the possibility of an extrauterine pregnancy, because as a matter of fact it is this type of endometrium which we most often find in such cases. If the tubal pregnancy is still progressing, i.e., if the trophoblast is still living and active, we would expect to find real decidua, but in this stage there is usually little or no uterine bleeding, so that curettage would be an unwise procedure.

It is not at all surprising to find evidence of secretions in the desquamated tissue, for during the first day or two of menstruation the whole compacta and a great deal of the spongiosa are thrown off, and the gland epithelium may well show abundant evidence of secretion. When we were studying the histology of the menstruating uterus some years ago we made use of a method somewhat like Dr. Geist's. Women in the dispensary were given kettles of formalin, and were directed to place the menstrual napkins at once into these vessels. A study was then made for bits of tissue, but only small amounts were found, presumably because of the rapid degeneration and autolysis which takes place.

Finally, I was interested in Dr. Geist's observations on cases of hyperplasia, because we likewise, in the study of the entire uterus of patients with hyperplasia, found the surface to be perfectly intact. I have not been able to convince myself that the bleeding is due, as Schroeder states, to small localized areas of necrosis, and I firmly believe that the important factor is one which increases the permeability of the blood vessels so that extensive bleeding may occur even with an intact surface.

DR. OTTO H. SCHWARZ, ST. LOUIS, MO.—I was interested in the section that Dr. Geist showed from a case of dysmenorrhea. I wonder if he has noticed whether there was any increase in the eosinophiles. Dr. Smith of Washington University has been studying a good many cases of dysmenorrhea and he has followed Duke's suggestion as regards the relation of allergy to essential dysmenorrhea. He has tested a good number of these patients and has found them sensitive to certain food and other substances; by withholding these substances from their diet, many of these patients markedly improved. In some instances the results were most striking. I should like to ask Dr. Geist to check this point if he has not done so already, because it may be of some value along this line. Eosinophiles have been found in large numbers in nasal conditions due to allergy. From Smith's observations I would suggest that they might also be demonstrated in the endometrium in cases of dysmenorrhea.

DR. KARL H. MARTZLOFF, PORTLAND, OREGON.—I would like to ask whether these endometrial fragments are found in fresh preparations as well as in fixed specimens? I think also one should recognize two phases in the history of menstruation. The first is the history of bleeding which the patient always notices and which she calls the first day of menstruation. The other phase is, I think,

not so generally recognized and might be termed the occult phase. Women generally begin to bleed between twelve and twenty-four hours before they are cognizant of their blood loss. I have made several such observations on women who came in for examination and noticed with the colposcope or the naked eye the discharge of blood from the external os of the cervix and on inquiry found they were just about ready to menstruate. From twelve to twenty-four hours after this observation of occult bleeding the macroscopic bleeding occurred.

Dr. Novak and Dr. Culbertson both brought out the question of the decidua-like reaction in some of this endometrium, and Dr. Geist suggested that it might be a factor in the causation of some types of dysmenorrhea. I rather question the logic of that inference for the reason that one does occasionally see in the uterine curettings from individuals who are curetted for reasons other than dysmenorrhea, an interglandular stroma that is very suggestive of decidual reaction.

DR. GEIST (closing).—Dr. Culbertson mentioned the fact that the utilization of the presence of vaginal epithelium for diagnosis was not sufficient. I am sorry that I did not make myself more clear. I had no intention of implying that this finding was sufficiently characteristic to warrant a diagnosis. It is practically a 100 per cent finding but it occurs in so many other conditions that we do not use it as a definite diagnostic sign, only as an additional aid. We use only the presence of endometrium as a means of identifying the fluid.

I forgot to mention that in 9 per cent of cases that showed no endometrium, we believe the reason we were not able to recover endometrium was that either the material was insufficient or not properly examined, or that these cases fell in the group that Heape and Corner subsequently described in monkeys who menstruate without any desquamation whatever.

The advantage of the diagnostic significance of this procedure over that of curettage is that this examination is a simple procedure. It takes twenty-four hours and is associated with an operative intervention or risk. If it gives no information one may always have recourse to curettage.

In reference to the question of the endometrium found in ectopic pregnancy, in our experience with the investigation of vaginal blood in ectopic pregnancy, we never found endometrium in the vaginal blood associated with ectopic pregnancy that in any way represented the condition of a menstruating uterus. Undoubtedly in the uterus we may have a resting mucosa with an ectopic pregnancy late in the pregnancy but the desquamation that takes place in ectopic pregnancy is the desquamation from the decidual part of the endometrium and once that is completed the remaining or regenerating uterine mucosa does not further exfoliate. For that reason when we find endometrium in the vaginal blood we can safely say that there is no ectopic pregnancy present.

We have not studied the question of eosinophilia in these fragments. We have found many lymphocytes but we have not investigated the differential cell count.

The examinations were made in fresh material and immediately fixed. The unfixed fresh material does not lend itself to examination.

16. **Reradiations in the Radium Therapy of Carcinoma of the Cervix Uteri,** by Drs. George Gray Ward and Lilian K. P. Farrar, New York, N. Y. (Paper read by Dr. Ward.) See page 543, October issue.)

17. **A Five to Fifteen Year Follow-Up Study of One Hundred Ninety-Two Cervical Cancers,** by Dr. Frank W. Lynch, San Francisco, Calif. (See page 550, October issue.)

18. **Conclusions From a Study of Five-Year Cures in a Series of 121 Cases of Carcinoma of the Cervix Uteri,** by Dr. Harry S. Crossen, St. Louis, Mo. (See page 559, October issue.)

DISCUSSION

DR. WILLIAM P. HEALY, NEW YORK.—With regard to Dr. Ward's communication, I think it is unfortunate that he uses the title re-treatment because after all he is speaking of treatment of recurrences and not reradiation. Therefore, we are not dealing at all with the question of whether cancer is or is not resistant to reradiation. As a matter of fact, it is resistant; that is an established scientific fact and Heyman definitely makes the statement that you cannot advantageously reradiate cervical cancer that has been once adequately irradiated. It would be helpful to know whether his re-treatments were in early, borderline or advanced cases.

I would like to criticize the use of the word "test" dose. Dr. Ward stated that his test dose ran from 2,400 to 4,800 mg. hrs. Such doses of radium properly applied to an early cancer will cure it, but if it is not sufficient the re-treatments that become necessary are for adequately treated disease, and if it responds to the re-treatment, it is an indication that it was treated inadequately in the beginning. Treatment two years afterward is not a re-treatment of the original disease. Fifty per cent of Dr. Ward's cases required re-treatment; 26.5 per cent of those cases survived five or more years. That is exactly 13.25 per cent of his original number of cases. In all of our advanced cases, with radiation therapy, 14 per cent will live five or more years.

As an indication of how frequently re-treatment is utilized, I went over 1,574 cases at the Memorial Hospital from 1918 to 1930 inclusive and in our early cases 10 had re-treatments. Of the borderline cases, 26; and of the advanced cases, 144, making a total of 180 cases out of 1,574. Only one of those 180 cases survived any length of time after the re-treatment. The others died within six months to a year.

When you adequately treat cancer of the cervix, whether the case is early, borderline or advanced, with radium and deep roentgen-ray therapy, in the first series of treatments you will in every instance where it is going to respond, obtain complete primary healing in two months. If you have not obtained complete primary healing in that time with adequate radiation it is doubtful if you ever will get it.

I want to emphasize one point in regard to the method we think best in handling all cases of cancer of the cervix. We do not now treat them with radium first as we formerly did unless the case is very favorable for treatment by irradiation. If it is a very limited lesion we treat it first with vaginal applications of radium. But three out of four of our cases are advanced and are not favorable to radium treatment applied first. For about two years we have been carrying out, in all such cases preliminary deep roentgen-ray therapy and following it a week or ten days later with radium applied to the cervix, and we believe there is no doubt that it is increasing the benefit of radiation therapy.

Dr. Lynch's paper emphasizes the point that good surgical technic in early cases will give as good end-results in treatment of cancer of the cervix as can be obtained by radiation therapy. He emphasized the question of clinical grouping. Compare that in different institutions. Bowing and Fricke at The Mayo Clinic classify 2 per cent as borderline and early; Dr. Lynch 27 per cent early and borderline; and out of our 1,574 cases we group 387 or 24.5 per cent as early and borderline. That is a personal equation, but see what a difference it would make in the end-results in the early and borderline groups. I feel that the whole question hinges not upon how many early or borderline or very advanced cases we have,

but what is the salvage at the end of five years in all cases of cancer of the cervix. Dr. Lynch combined radium with operation, and said that 57.2 per cent of all his patients were still living and in good shape at the end of a year. At the Memorial Hospital with the method we carry out of roentgen-ray and radium therapy, at the end of one year, and we do not refuse anything but the most hopeless cases, 83.4 per cent of our patients are still under observation. At the end of two years Dr. Lynch's group shows 39 per cent, at our hospital 52 per cent. At the end of five years we are on the same level, 20 to 22 per cent.

It would seem, then, that the outlook for the cure of carcinoma of the cervix is not a happy one, for a study of the leading surgical and radiation statistics indicates that by either method of treatment 80 per cent of all cases seen will fail to survive five years.

The most important thing is that if you can get these cases early and treat them by roentgen-ray therapy combined with radium you may save 60 per cent for five years.

DR. FREDERICK J. TAUSSIG, ST. LOUIS, MO.—Dr. Healy has mentioned the difficulty of any comparison of statistics from different institutions. I think perhaps of greater value is the comparison of statistics at various periods coming from the same institution. We had an illustration of that from the report of the University of Munich. I therefore thought it might be worth while to look through the records of the Barnard Skin and Cancer Hospital which has been under the care of Dr. Gellhorn and myself since 1906. The first five years have not been included in this report. The cases from the years 1912 to 1926 were largely advanced cases because of the fact that in a cancer hospital we act as a dumping ground for other hospitals and also because we have in St. Louis a large negro population. In the follow-up work there are great difficulties owing to the large number of patients coming from southern states where vital statistics are inaccurately kept. We were thus unable to trace 75 out of 432 cases (18 per cent). During this period of fifteen years we had 432 patients treated either with radium or by operation. In the first five-year period 83 patients showed four cures, or 4.8 per cent. The following five years comprised 137 patients with 13 cures, or 9 per cent. In the last five years, we had 212 cases with 26 cures, or 12.1 per cent. This shows a gradually increasing saving of life. Our percentage in groups III and IV for the first five-year period 1912 to 1916, was 81 per cent of the total, and in the last ten years 73 per cent of the total. There were 68 of group I and group II cases in the last ten years and 21 have been cured five years or more, a curability of 38.8 per cent. Of the cured cases it is of special interest that 12 operated cases had an average of nine years free of recurrence, and 18 radium cases had an average of only seven and one-half years free of recurrence. In other words it would point to the fact that the radium cases cured five years were more apt to show a recurrence than those that were treated by operation.

During the period 1917 to 1926 we used both radium and surgery. Previous to that we had no radium. Therefore a comparison of our operative results and our radium results might be of some interest. The group I cases operated upon numbered 15 with 9 cures (60 per cent). The radiated cases of group I numbered 9 with 4 cures (44.4 per cent). In Group II cases there were 14 operated upon with 5 cures (35.7 per cent), as compared with 21 radium cases, which showed five cures (23.8 per cent). In both Group I and Group II cases our results were slightly better with surgery than with radium. I want to say that in most of these operative cases radium or x-ray was used in addition to the surgical work so that some of the credit must go to the radiation but it does seem to me that these figures point very strongly to the fact that in these Group I and Group II cases the radical

Wertheim or Schauta operations have definite value and are in our experience superior to the use of radium alone. A more detailed report of our results will be reported at a later date.

DR. WARD (closing).—I accept Dr. Healy's criticism as to the matter of the term we used. Whether he prefers the term "reradiation" or "re-treatment" is a matter of no importance to me, although I think "reradiation" more correctly expresses what we do, as "re-treatment" might mean anything. I think it may clear the point to say that in the "re-treatments" that we have been following out in the Woman's Hospital it is not to reradiate the original cancer site, which has already been taken care of, but the recurrences in the way of metastases that occur in different parts of the vaginal tract or in the margins near the original site of the disease.

Dr. Healy objected to the term "test" dose. I wish we had the ability that he has, and that the others at the Memorial Hospital have, to know exactly what dose to give for any type of cell that he examines simply by looking at it. We cannot always tell just exactly what result will come from the individual application in each case. Therefore, I still think that the term "test" dose is not a misnomer. We give practically the standardized dose and in our subsequent follow-up of the case we may feel that we did not give quite enough for that particular type of cell. Perhaps a margin of the cervix may still be active, and we will therefore give a secondary treatment at that point. However, after all, what counts is the total result, and I believe that the frequent and personal follow-up, which I do not think many clinics carry out, has enabled us to discover recurrences where they would have been missed otherwise, and to re-treat those recurrences with a saving of life. When we have for a period of eleven years a figure of 25.9 per cent salvage of the total cases treated by our technic, and 57.1 per cent of the early cases, and 17.7 per cent of the advanced cases, as shown in the audit made by statisticians, it seems to me that the proof is conclusive. We certainly have saved some cases by our frequent re-examinations and "re-treatments."

I noticed that Dr. Lynch's classification of cases as to the extent of the disease almost identically corresponds with our own percentages. We have 25.9 per cent in Groups I and II, and 74.1 per cent for Groups III and IV. So apparently we have judged the cases in a very similar way. We all agree that the Wertheim radical operation will produce the results in the early cases. The point is that everybody is not capable of doing a Wertheim operation as Dr. Lynch and some others are, and it is a very frequent observation to see patients who have had the uterus removed by the ordinary panhysterectomy, which is not giving the woman a fair show. Likewise radiation is by no means the simple thing that one would imagine from reading the advertisements in the medical press, often stating that if you will send your diagnosis of the case they will send you the right amount of radium and you can treat it as well as anybody else. We know that it requires clinical experience and judgment to understand the effects of radium and we think, therefore, that it is a dangerous thing for the general practitioner without radiologic and clinical experience to treat these cases. Just as much damage can be done by destroying tissues unnecessarily as with the radical surgical operation. The hope that we have is that with the high voltage x-ray therapy, the involvements beyond the local point of internal application of radium will be taken care of. At the Woman's Hospital we have only had the high voltage apparatus for the past two years so that we are not giving any figures therefore as to the results with the combined treatment. Regaud stated in his Liverpool address that there is no question that with the deep x-ray therapy his recent results are going to take care of the 43 per cent of gland involvement that Victor Bonney describes.

DR. LYNCH (closing).—I am not urging surgery for the treatment of cervical cancers as much as I am pleading for cancer clinics in which the subject may be properly investigated. Without much material, such studies as mine must proceed slowly. A man may spend his entire life and end up with a series so small that it is scarcely worth consideration. I feel that our series are of interest largely because our follow-up has shown us what has happened to our cases. Our results with surgery speak for themselves, yet the method is brutal and sooner or later if we are to cure cancer some method must be found which will eliminate surgery.

One must realize, however, that the sooner we standardize the treatment of cancer, the better. Our work as far as we have gone suggests that the biologic and histologic study of women with late recurrences offer the greatest field for investigation at the present time. The efficiency of our follow-up is shown by the fact that in a series of 350 cervical cancers only two have escaped. These two were followed between three and three and a half years before they were lost sight of. We have not lost a case from the follow-up for ten years. The efficiency of the follow-up for the five-year series is 99 per cent.

OBSTETRICAL SOCIETY OF PHILADELPHIA

STATED MEETING, MARCH 5, 1931

DRS. N. F. PAXSON AND H. S. RUTH presented papers on **Obstetric Anesthesia and Analgesia With Sodium-Iso-Amyl-Ethyl-Barbiturate and Nitrous-Oxide-Oxygen.** (For original article see page 90.)

DISCUSSION

DR. JOHN C. HIRST.—I find the administration of sodium amytal by mouth much easier and just as effective, and I use it as soon as the patient enters the hospital in labor: 6 grains on admission, and 6 more in an hour or two, but never more than 18 to 24 grains altogether.

I do not believe that this so-called anesthesia affects pain, but it does affect memory, its main advantages being that it lasts a long time, sufficient for any labor, does not stop the pains and has no bad effect on the baby. Its disadvantages are often extreme restlessness, and that it cannot be given to the asthenic type of patient with low blood pressure. I have used sodium amytal in a total of more than 300 cases, at first by rectum but later by mouth, reserving gas anesthesia for the actual delivery in most instances.

We stopped using it by rectum at the University Hospital Maternity after two reported series, totaling only about 80 cases, because the restlessness after rectal administration required excessive nursing attention to a much greater degree than by the oral method.

DR. HENRY S. RUTH.—Regarding the administration of sodium amytal by mouth, I have been using the drug almost routinely by this method since its introduction as a preliminary medication for general surgery. Consequently, I feel that I am thoroughly familiar with its action following the oral administration. It is my belief that it is a fallacy to employ by mouth the large doses occasionally quoted, for we cannot predetermine the tolerance of any one individual, for there are too many variable factors such as body weight, age, nervous tension, etc. We do not fear an excessive blood pressure fall with the intravenous method for we have never encountered this condition. Blood-pressure readings are always taken before and during its intravenous administration, and if a severe fall develops, the

injection is stopped immediately. Sise reports a method of dissolving ephedrin in the sodium amytal solution and injecting the two concomitantly to prevent a fall in blood pressure. With our method of intravenous administration this was not deemed necessary for the dosage employed has never caused an alarming fall.

DR. PAXSON (closing).—Giving this anesthetic intravenously has the advantage of accurate control so that complete analgesia is obtained with much less danger of restlessness. Administration by mouth is simpler, but the danger of restlessness is markedly increased and the dosage is not satisfactorily adjusted to the patient.

DR. CATHARINE MACFARLANE presented a paper entitled **Carcinoma Developing in a Myomatous Uterus After X-Ray Menopause.** (For original article see page 108.)

DISCUSSION

DR. CHARLES C. NORRIS.—In a series of about 600 cases treated by radiation in the Gynecologic Department of the University Hospital, success has followed the treatment in 94 per cent.

Myoma and carcinoma of the fundus are frequently associated and the symptoms of the latter are prone to be masked by those of the benign tumor. To prevent overlooking the carcinoma in these cases a routine diagnostic curettage should be performed, and this applies even more strongly if x-ray is employed instead of radium.

Although not absolutely conclusive, the Clark test is a valuable adjunct in the diagnosis of fundal carcinoma. This consists in cleansing the vagina and passing a sterile sound to the fundus, the point of which is then gently manipulated over the endometrium. If a friable, vascular growth such as carcinoma is present, the procedure is followed by a trickle of blood. This test may be employed in the office. I have never seen it fail when a cancer was present. It should not be used unless pregnancy can be excluded.

I have personally never observed a case of carcinoma developing in a uterus after irradiation. However, there are in the literature a few such instances, for obviously irradiation is no preventive to the subsequent development of carcinoma. After the establishment of the surgical or irradiation menopause, carcinoma has been observed to develop in extremely young women.

Most of us are in the habit of rather stressing the age factor in uterine cancers. As a matter of fact age in years is not the important point, but rather the sex age. It is the absence of the ovarian and other hormones, with the resulting senile changes in the uterus which are the predisposing factors. It is well known that the carcinoma age is lower in the tropical countries where the menopause occurs earlier.

I believe that all myoma cases which have been treated by irradiation should be kept under observation. It is my custom to have patients report for follow-up observation every three months for a period of two years.

I do not believe that the irritation following intrauterine irradiation is an important factor in the subsequent development of carcinoma. I have examined a number of uteri which have been so treated, and after two or three months it is impossible to demonstrate the site of irradiation.

DR. GEORGE E. PFAHLER.—The patient under discussion was referred to me by Dr. Ellen Brown of Chester, who had made very careful studies of the case. Her opinion was that no malignant disease was present.

She had at the time a complete study of the blood made, but the striking fact

was that the hemoglobin was down to 40. The patient refused operation. She had a fibroid of the uterus which extended to the umbilicus which we do not treat if we can avoid it because of the size: but if one has no choice, I think irradiation is better than letting the patient die, even though one does take risk of skin damage.

This patient was treated by low voltage rays, because we had no high voltage rays at that time, and because the large tumor had to be crossbarred. This accounts for considerable fibrosis present after fourteen years, and made the operation by Dr. Macfarlane more difficult. This fibrosis can generally be avoided today by the use of high voltage rays, and it can be improved because of a greater depth value.

The curettage that I did was under morphine and hyoscine. The microscopic report was negative, therefore, after twenty-four hours, we removed the radium, 150 mg. Had I been treating it on the basis of adenomatous carcinoma, I would have left it in forty-eight hours which might have prevented the further growth or the later development of this carcinoma.

The curettage being negative, we applied radium for twenty-four hours. The carcinoma was still confined to the uterus even at the operation.

Coming to the question of removal of all these uteri: there is also the possibility of development of carcinoma in the cervical stump, and if you do a complete operation you also have the possibility of carcinoma of the scar.

We have about fifteen times as many cases of carcinoma in the routine cases, as in those treated by irradiation. It would seem, therefore, that irradiation prevents development of carcinoma.

I do not believe that irradiation causes carcinoma in the deeper tissues.

DR. STEPHEN E. TRACY.—About two and one-half years ago, a patient aged sixty-three, came under observation who complained of vaginal bleeding. Examination showed a myomatous uterus irregularly enlarged to the size of a three months' pregnancy.

A diagnostic dilatation and curettement was performed. The pathologist reported there was no malignancy. As she was fat, flabby, and a poor surgical risk it was decided to use radium and she was given 1,500 mg. hours. Nine months later she returned and stated she had had vaginal bleeding for a few weeks. Examination showed the uterus had shrunken more than 50 per cent.

She was again dilated and curetted and as the tissue did not appear, macroscopically, to be malignant, she was given a second treatment of 1,500 mg. hr. of radium. Histologic examination of the tissue secured at the second curettement showed an adenocarcinoma.

The patient was not seen again for another nine months. At that time she complained of a vaginal discharge and of a distress in the pelvis, and she had some fever.

At examination the uterus was found to be cystic, enlarged and halfway to the umbilicus.

When the cervical canal was dilated a considerable quantity of purulent fluid and necrotic tissue rolled out. After the fever subsided and she was in better condition, operation was recommended and was promptly refused.

DR. WILLIAM R. NICHOLSON.—The comparative rarity of carcinoma developing in the cervix after supravaginal hysterectomy, and further, the fact that if the cervix stump is coned out in a hysterectomy for uterine myoma and then subsequently, after the woman has convalesced, obliterates the canal from below with the cautery, one practically does away with any likelihood of subsequent carcinomatous development. The advantage of this procedure over the panhysterectomy as a routine for fibroid is very evident in that the mortality is decidedly less and

in addition to that the attachments of the uterosacral ligaments remain uninjured, thus preventing the possibility of vaginal prolapse.

It seems to me that there can be no question that the operation for myoma of the uterus is far better than the use of radium or x-ray since the mortality is low and the late results good. In any event, it is very definitely my opinion that no x-ray or radium should be used therapeutically in fibroids larger than a two months' pregnancy.

DR. R. W. MOHLER read a paper on **Breech Presentations.** (For original article see page 61.)

DRS. P. B. BLAND, A. FIRST AND P. ROEDER presented a paper entitled **A Comparative Study of the Aschheim-Zondek and Mazer-Hoffman Tests for Early Pregnancy.** (For original article see page 83.)

DISCUSSION

DR. CHARLES MAZER.—I have no criticism to offer with the exception as to the occurrence of ovarian hyperfunction. The concensus of opinion is that the hyperfunctional states of the ovaries do not exist. The occasional finding of an excess of female sex hormone in the urine of women suffering from functional sterility is, in my opinion, due to the inability of the endometrium to concentrate the hormone in the absence of the lutein phase of the ovarian cycle.

Hyperfunctional states of the pituitary gland, on the other hand, are recognized entities. Fluhmann has shown that 40 per cent of menopausal and castrated women have an excess of anterior pituitary sex hormone in the circulating blood. I have demonstrated an excess of the hormone in 50 per cent of women suffering from primary ovarian failure. In these women the kidneys often eliminate a sufficient quantity of the hormone to render a positive reaction in the nonpregnant state.

Numerous European investigators found the Aschheim-Zondek test correct in 98 per cent. Brouha and his coworkers, however, found the test subject to a 40 per cent element of error and therefore modified the test by employing male instead of female mice.

JOINT MEETING OF THE CHICAGO GYNECOLOGICAL AND CHICAGO UROLOGICAL SOCIETIES

FEBRUARY 26, 1931

SYMPOSIUM ON STERILITY

DR. HENRY SCHMITZ presented a paper entitled, **Some Notes on Sterility Due to Obstruction in the Uterine Tubes.** (For original article, see page 47.)

DR. VICTOR D. LESPINASSE presented a paper entitled, **Sterility in the Male Due to (a) Deficiency of Spermatozoa; (b) Obstruction of the Passages.**

DISCUSSION

DR. N. S. HEANEY.—It would be interesting to know in connection with Dr. Schmitz' operation how many patients failed to become pregnant promptly and how many started to use contraceptives right after operation.

I believe I have only operated upon two patients for tubal obstruction solely because of sterility. One of those patients had a chronic tuberculosis which could not be diagnosed by the history. The tubes were tuberculous. The tubes were left open but the response to the patency test was negative. I have done Touffier's operation of transplanting the ovary into the uterus.

DR. IRVING F. STEIN.—One or two minor points bear correction. Lipiodol is not a solution of iodine in oil, but a chemical compound of iodine. Poppy seed oil contains 40 per cent of iodine by volume. One point about pneumoperitoneum is that it requires only about a liter of gas and the discomfort is very transient. In less than an hour many patients can get up and go home after transabdominal or transuterine pneumoperitoneum. There is no cardiac disturbance with a liter of gas. I can say this from an experience of 500 pneumoperitoneums.

The term infantile uterus is not a good one to use. Many patients who have been described as having infantile uteri and later became pregnant did not have an infantile but an immature uterus that developed later through stimulation or through natural causes. We are just in the midst of studying a series of 300 cases of patients who have come to us because they were childless. We found among them a number who were not sterile but were not fruitful. I have not come to the point of the number of pregnancies nor is that important for this evening's meeting. We had 44 cases that were found to have a definite tubal obstruction on testing both with gas and lipiodol. Nine patients were operated upon for tubal obstruction. In four salpingostomy was performed, in two hysterectomy, in two myomectomy, and in one salpingectomy. Among four salpingostomies there were two pregnancies. I do not mean we have 50 per cent success, because with a series of four any estimation of percentage is ridiculous.

DR. J. P. GREENHILL.—Dr. Schmitz made the statement that pelvic infections are self-limited. I think we as gynecologists should bear that in mind. Last year a report came from Stockholm of 700 cases of salpingitis in which only 25 per cent of the patients had not become pregnant. That behooves us to be very careful in removing structures.

Dr. Schmitz said that 75 per cent of female pelvic infections are due to gonorrhea, about 20 per cent to sepsis, and about 5 per cent to tuberculosis. Some years ago I studied tuberculosis of the female genital tract and found 6 to 10 per cent of tubal infections due to tuberculosis. I know of only one case in the literature where a patient became pregnant after being treated for tuberculosis of the tubes proved microscopically. Most people with tuberculous salpingitis remain sterile.

Regarding the Rubin test, many feel that with this test they can accomplish all they wish for in sterility. As Dr. Stein indicated, the actual technic of the test is simple but the follow-up with x-ray and the matter of interpretation are not so simple.

I have had two cases of full-term pregnancy following salpingostomy.

I would like to ask Dr. Lespinasse if he has had many successes in injecting sperm into the uterus three to four days before menstruation. It is hardly conceivable that the injection of sperm at this time will fertilize the ovum.

DR. HARRY C. ROLNICK.—It is my impression that the treatment of male sterility still lies with the experimental laboratory. I do not mean the obstruction type, but those cases that are sometimes classified as endocrines. The researches of Oscar Riddle and of Moore at the University of Chicago are the most outstanding of all on the gonads and gonad metabolism. I think a good many males are sterile due to cross breeding or inbreeding and while normal otherwise have spermatozoa which will never develop. There are a good many others whose endocrine causes we do not quite understand. Riddle showed that a good many birds have

accessory thymus tissue that may persist and prevent full sexual development. Recently Moore in his presentation at the University of Chicago before the Biological Club described a series of experiments, which showed that the pituitary has a definite action not so much on the testes but on the accessories, the vas, prostate and vesicles, and that the pituitary prevents the development of these accessories, although the testicle is rather fully developed at birth.

Many individuals who have chronic prostatovesiculitis not of venereal origin have a definite deficiency in sperm. What that prostatovesoculitis is due to is hard to say.

The method of diagnosing the presence of sperm in the testes suggested by Huhner was aspiration of the testes. It does not appeal to me and impresses me as not being of much value.

DR. ALFRED E. JONES.—A better understanding of the subject of male sterility could be had if we considered some of the experiments which the veterinary surgeons have been doing recently. These surgeons have found out that in breeding cattle the number of pregnancies is definitely proportionate to the preponderance of the normal spermatozoa over the abnormal. This study has also been taken up by the gynecologists, especially in Europe, and has been confirmed. If this is true, then the motility which we used to think was very important will be relegated to at least second-class importance.

In the discussion of the subject of sterility the gynecologists must necessarily hold the stage at the present time, because we must confess that their results are much more definite than the results of the urologists. This is true not only because of the anatomical construction of the female genital tract but because of refinements in diagnosis, patency tests, etc. In our experience whatever success we have had has been in cases in which we were able to demonstrate pathology in the genital or urinary tract, chronic vesiculitis or prostatitis or stricture of the ureter, etc. When this was corrected and only then did we have success.

DR. CHARLES M. McKENNA.—I was interested in the etiologic factors brought out by both Dr. Schmitz and Dr. Lespinasse and especially what they had to say concerning the question of tuberculosis. At the Municipal Tuberculosis Sanitarium we had occasion to make postmortem examinations in 174 cases, during which we made a comparative study of tuberculosis of the urogenital tract in both men and women. In these 174 cases we found there was less tuberculosis in the genital tract of women than of men.

DR. SCHMITZ (closing).—As I said these methods of diagnosis described by me are only indicated when there is no palpable pathology. If there are cysts or inflamed tubes palpable in the pelvic cavity there is sufficient reason for sterility.

As to the question of tuberculosis in women, statistics collected in central Europe show that in the northern part of Europe they have 17 per cent of tuberculous salpingitis while in southern Germany they have less than 5 per cent, so I feel that the average in our patients is very nearly correct and that tuberculosis of the tubes is very frequently found. I only dwelt on the subject of sterility due to closed tubes.

DR. LESPINASSE (closing).—I would like to discuss Dr. Schmitz' comment regarding uterine spasm. I have had a very large experience in the injection of semen in the uterus. My first experience was with a relatively large catheter and a relatively large amount of semen. That woman had intense spasm. To obviate that spasm I had made some small tubes from 1 to 1½ mm. in diameter and then I found if I injected more than 15 minims, spasm was almost certain. When this work of injecting lipiodol and other solutions into the uterus came out it was inconceivable to me how that amount of material could be injected into the uterus and not cause spasm, from my previous experience with semen.

CHICAGO GYNECOLOGICAL SOCIETY

STATED MEETING MARCH 20, 1931

DR. R. A. SCOTT reported a case of **Combined Pregnancy.**

Mrs. W., aged thirty-three, was awakened at 4:00 A.M. on Dec. 26, 1929 by a severe cramp-like pain in the lower left quadrant of the abdomen. Immediately following the pain, the patient developed severe nausea and a moderate vaginal bloody discharge. One hour after the onset of the cramp-like pain, it was necessary to administer ¼ grain of morphine hypodermically. The patient was hospitalized with the tentative diagnosis of ruptured tubal pregnancy on the left side.

Previous history revealed an irregular menstruation and during the past two months a complete amenorrhea. Bilateral tenderness and pain had been present for past ten days. On two occasions during past week there was noticed a slight vaginal bleeding. The patient's general health had been good with the exception of a moderate amount of nausea.

The general examination was negative; temperature 99° F.; pulse rate 80; respirations 20. Palpation of lower quadrants of the abdomen elicited tenderness and in the left quadrant could be felt a mass which was extremely sensitive. Bimanual examination revealed an irregular soft cyst-like mass on the left side extending down into the culdesac to a point a little beyond the median line. The uterus seemed slightly enlarged and in an approximately normal position. Nothing unusual was found on the right side and the examination caused no discomfort. A moderate amount of serosanguinous vaginal discharge was noted.

Laboratory Findings.—Hb. 66 per cent, R.B.C. 3,690,000, W.B.C. 16,500. A catheterized specimen of the urine showed 1 per cent albumin, occasional granular and hyaline casts, occasional leucocytes, frequent epithelial cells.

For some unknown reason the blood pressure was not taken. Another careful bimanual examination was made on the evening of the same day, after an enema. The cystic consistency of the mass was misleading because there were no gross symptoms of internal hemorrhage with accompanying shock and rapid pulse symptomatic of a ruptured tubal pregnancy. The presence of an ovarian cyst which had twisted on its pedicle giving the symptoms and findings previously described had to be considered, bearing in mind the history of irregular menstruation. During the next four days the blood counts showed that the hemoglobin dropped from 66 per cent to 60 per cent, the R.B.C. from 3,690,000 to 3,310,000 and the W.B.C. varied between 14,900 and 16,850. Convinced that there must exist some bleeding point within the abdomen, probably the left tube, a preoperative diagnosis was made of ruptured ectopic pregnancy

Laparotomy was performed five days following the original acute attack of pain. Midline abdominal incision revealed a uterus lying anterior, approximately the size of a two months' pregnancy, and to the left and posterior an enlarged tube with a rent in its wall near the distal end filled with blood clot. Adherent to the tube and covered with dark blood clot was a parovarian cyst approximately 4 cm. in diameter. There was also a large number of dark colored clots in the culdesac. The left fallopian tube with adherent cyst, was removed. Abdomen closed in the usual manner, no drainage. Patient made a slow but uneventful recovery.

On June 5, 1930, patient consulted an obstetrician and gave the date of the beginning of her last menstruation as October 26, 1929, which date was about two months previous to the date of her operation for a ruptured ectopic pregnancy. A normal baby was delivered following an induction of labor because of a complicating nephritis, on August 7, 1930. Baby weighed 6 pounds 8½ ounces.

Due to the fact that the uterus was slightly enlarged, as a result of the tubal pregnancy, there was no thought given to a possible uterine pregnancy and no postoperative sedatives were given in more than normal amount to allay pain than in any surgical case. It is surprising that the uterus did not empty itself after the above operative procedure.

DR. A. F. LASH reported a case of **Preeclampsia in an Abdominal Pregnancy.**

N. LeF., a negress, thirty-one years of age, gravida ii, entered the Obstetrical Department of the Cook County Hospital on January 2, 1931, complaining of vaginal bleeding of five and one-half days' duration. Her last period was May 10, 1930. The pregnancy had progressed normally except for some "misery" in the lower left side of the abdomen which occurred in the latter part of June. Also in August she had a "falling of the womb" which confined her in the hospital for four days. The cervix was found prolapsed about 6 to 8 cm.

For the first time she experienced pain across the lower part of the abdomen about eighteen hours before admission.

She had one previous pregnancy only in 1921.

The well-developed and well-nourished negress had normal temperature, pulse and respirations, and generalized edema. Blood pressure 210/110. The abdomen was round, soft and elastic with no rigidity or tenderness. The pelvic mass rose to 4 fingers below the xiphoid. A small baby was palpable in the transverse presentation (Scap. R.A.). The fetal heart tones were very distinct and near the surface, having a rate of 144.

On the basis of the history a tentative diagnosis of placenta previa was made and a routine vaginal examination done to determine the source of the bleeding. The essential findings were: A long, thick, patent cervix extending down to the vaginal orifice and intimately associated with a firm mass in the culdesac which was mistaken at first for a fibroid but by intracervical digital exploration, it was found to be the retroflexed corpus.

The abdomen was again examined and no round ligaments were palpable. Therefore the diagnosis was made of abdominal pregnancy. The blood picture was normal. The Wassermann test was negative.

The operation was performed under spinal anesthesia using spinocaine (2 c.c.). After opening the peritoneal cavity through a long lower midline incision, a large sac resembling an ovarian cyst and over which large vessels coursed, was seen. The omentum and two loops of small intestine were adherent to the sac. There was no free blood. Although I attempted to open the sac through a bloodless area, I encountered a cotelydon which was clamped with ring forceps.

A live baby was delivered weighing 5 pounds 10 ounces. The right side of the face was flattened. The cord was clamped and cut. The omentum and loops of bowels were freed. It was then found that by clamping around the base of the sac, it could be removed, separating it from the adherent corpus. Since the patient was in good condition and as there were many fibroids in the corpus a subtotal hysterectomy was performed. All clamped tissue was ligated and the vesical peritoneum was used to cover the cervical stump and the broad ligament. The abdominal wall was closed.

The postoperative course was febrile for the first twelve days, although the patient was fairly comfortable. The wound healed by primary union. Mother and child left the hospital on the twenty-fourth postoperative day. The mother's blood pressure was 120/70. When the mother was seen on February 13, in the

postnatal clinic, no palpable pelvic pathology was found. Her blood pressure was 160/90. The baby was well and growing.

The specimen consisted of a large sac whose outer surface was smooth and covered with large blood vessels. Posteriorly a part of the ampullar portion and the fimbriated end of the tube (3 cm.) was seen as well as a thickened area resembling ovarian tissue. The interior of the sac was the amniotic sac with several separated cotelydons forming the placenta as vessels from these fused to form the umbilical cord.

Microscopic sections of the sac, through free and placental parts showed decidual cells. The fallopian tube and a corpus luteum were seen in the sections through the areas described above. The decidua of the corpus uteri showed superficial necrosis. The final diagnosis was intraligamentary pregnancy secondary to tubal rupture complicated by preeclampsia.

DR. R. A. LIFVENDAHL reported a case of **Uterine Abscess, Hysterectomy, Recovery.** (See page 97.)

DR. RALPH REIS presented a specimen of **Fetal Sympody.**

DR. FRED L. ADAIR presented a paper entitled, **Syphilis of the Fetus and Newborn Infant.** (See page 111.)

DISCUSSION

DR. CHARLES S. BACON.—At the Salvation Army Hospital for the last four years, among 918 confinements, there were 46 mothers and 45 babies with positive Wassermanns, a frequency of 5 per cent. There was no doubt about the reaction because it was taken over two or three times, so all these women were considered syphilitic. Most of the women were white; perhaps one-fourth were negroes. They were all unmarried. Of the 45 babies the cord blood was positive except in one case. In that case about four months later, examination showed the blood to be positive. Four of the babies were stillborn and two died while in the hospital. They stay in the hospital generally from six weeks to three or four months. The fetal mortality was 13.3 per cent. Treatment was given as soon as the diagnosis was made after the patients came into the hospital, which was usually from the twenty-fourth to the thirty-sixth week. If the Wassermann was positive, they were put on a regular course of treatment, repeated if necessary. The babies were put on mercury and oil injections. They all did well, except the two who died.

I might say there were hardly any manifestations of syphilis in these women. In a few there were slight skin findings, but none of them would have led to the diagnosis had it not been for the Wassermann. None of the other babies showed any Wassermann reaction on the cord blood.

At the open clinic of the house cases at Grant Hospital there have been in the last five years about five cases which showed positive Wassermann. These patients generally come early and the results of treatment have been satisfactory in all cases. There were no deaths among the babies.

DR. ADAIR (closing).—I would just like to make it clear that these autopsies and results do not represent any one person's practice or clinic. We tried to secure autopsies on these newborn infants from all sources. It is more the result of the obstetric practice in the city at large than of any one clinic. It compares pretty well, relatively, with the general statistics of syphilis, 3 per cent in the whites and 23 per cent in negroes. The principal point about the presentation is

this, that syphilis still exists and unfortunately it is not productive of any good result so far as the fetus or newborn infant is concerned. There is no use treating the syphilitic infant after it is born, that is, one showing manifestations of syphilis soon after birth. The time to treat syphilis is before or during pregnancy and that means the recognition of syphilis in the potential or prospective mother.

Relative to the clinical findings and Wassermann reaction, I tried to make it clear that many of these Wassermanns were not made until after we had made the autopsy. We tried to check up but we did not obtain a Wassermann in all.

The statement that the clinical evidence of syphilis was absent does not mean very much because many of these patients were indifferently observed during pregnancy and afterward. I imagine if they had been more closely observed there would have been clinical manifestations of it discovered.

BALTIMORE OBSTETRICAL AND GYNECOLOGICAL SOCIETY

STATED MEETING, JANUARY 9, 1931

DR. WILLIAM SCHUMAN read a paper entitled **Fractured Pelvis in Obstetrics.** (For original article see page 103.)

DISCUSSION

DR. C. H. PECKHAM.—It seems in order to open the discussion of Dr. Schuman's paper by reporting briefly the history of a case of pregnancy following fractured pelvis which was seen in the obstetric service of the Johns Hopkins Hospital in the summer of 1930. The patient was admitted in labor and had not been seen previously. She stated that seven years before she had been severely injured in a motor accident and was operated upon at the Mercy Hospital, where she remained for two months. On discharge, she noticed that the left leg was shorter than the right. Three years later she became pregnant and went to term. After being in labor for nineteen hours at home, she was taken to another hospital, where cesarean section was performed. The present pregnancy was uneventful. Three days prior to admission, following a fall, the membranes ruptured and there had been slight bleeding ever since. Labor set in twenty-four hours before admission and the patient had been examined vaginally several times by her family physician. Just after entering the hospital, patient had a chill, temperature rose to 103° F., and the pulse to 120. The uterus was tightly contracted about the child, which lay in R.O.T., with the head just dipping into the superior strait. Fetal heart sounds were not heard. The external pelvic measurements were: 22, 29, 30, and 17 cm. Rectal examination showed the cervix 5 cm. dilated and the pelvic cavity obliquely contracted. Immediate delivery by craniotomy was done, following which the patient had a 1000 c.c. postpartum hemorrhage necessitating tamponade of the uterus. Following the operation, the patient did badly, temperature and pulse remained elevated and death occurred on the fifth day. Intrauterine culture taken at the time of delivery showed beta hemolytic staphylococcus aureus; and the day before death, the same organism was obtained from the blood.

Autopsy permission was obtained and the pelvis was dissected out and prepared for a museum specimen. Examination of this specimen showed a greatly distorted superior strait with the entire left side of the pelvis smaller than the right, the linea terminalis measuring 11.2 cm. on the left, as compared with 12.8 cm. on the right. This shortening was almost entirely limited to the iliac portion of the terminal length, which measures 4.7 and 5.9 cm., respectively. The con-

jugata vera extended obliquely and measured 7.75 cm. The symphysis pubis was fused and its anterior surface presented a nodular appearance, evidently the result of old inflammatory changes. Just to the right of the inferior margin of the symphysis, there was a spike-like projection of bone from the anterior surface of the ramus. The left sacro-iliac joint was distinctly abnormal and around it was marked callus formation which extended over the entire posterior portion of the left iliac crest. The articular surfaces were greatly widened with the sacral portion presenting a corrugated appearance.

From the findings, it was difficult to say exactly what the original injury had been, but it appeared that there must have been a fracture of the anterior wall of the pelvis, associated with serious injury to the left sacro-iliac joint and the adjoining innominate bone. Posteriorly, there was apparently an osteitic process resulting in marked callus formation, and the deformation of the left auricular facies of the sacrum. The lack of development of the iliac portion of the left terminal length must have been considered as partly trophic, as the original injury occurred when the patient was fourteen years old, and at a time before the pelvis had attained its full development.

DR. ROBERT W. JOHNSON, JR.—There are undoubtedly a large number of fractures of the pelvis in women, chiefly resulting from automobile accidents, without associated grave complications. When women are in the child-bearing age, this factor is of extreme importance to the orthopedic surgeon who treats them. Usually, however, the displacement of the fragments is so slight, the callus formation not exurberant and when discharged the great majority seem to present no contraindications to labor. Moreover, in over ten years I have had only two cases where pelvic distortion seemed enough to require forewarning the patient of the necessity of a cesarean delivery in future pregnancies. This represents a very small percentage, well under 10 per cent of the fractures of the pelvis treated, though I have not at the moment all the figures required to make the definite percentage report at present. However, it should be the duty of the surgeon or orthopedic surgeon who treats the child-bearing woman for a fractured pelvis to insist on her acquainting the obstetrician with the fact of her previous accident, so he may be forewarned, and an x-ray check-up made prior to labor.

DR. WILLIAM S. GARDNER read a paper entitled **The Origin of Ovarian Epithelium.** (For original article see page 54.)

DISCUSSION

DR. THOMAS S. CULLEN.—The ovary usually has a smooth, flat surface, but every now and then, where there are little clefts or depressions on the surface, one finds that the surface cells tend to become cuboidal. I have frequently noticed a similar change on the surface of the fallopian tube where it was covered with loose adhesions.

In the hilum of the ovary I have occasionally found irregular spaces lined with a low or high cylindrical epithelium.

At times real miniature uterine cavities are present in the ovary, as was pointed out by my colleague, the late William Wood Russell, in 1898.

The ovary must really be regarded as an embryo factory containing nearly all the elements necessary to produce a human being. At times, however, a stimulus comes along which causes certain groups of cells to develop and produce dermoid cysts.

Department of Book Reviews

CONDUCTED BY ROBERT T. FRANK, M.D., NEW YORK

REVIEW OF NEW BOOKS

GENERAL INTEREST

This is a good book.[1] Dr. Dickinson and Miss Beam have approached the same problem as Katherine Davis and Dr. Hamilton, but from another angle. It is exceedingly interesting that their conclusions are so similar. Though the emphasis in the collection of the material has been less definitely on the psychologic side, yet there is more psychologic insight and evaluation than has been evidenced in the published attitude of any previous gynecologist.

A correct emphasis has been placed on the fact that a single photographic picture of a woman taken at one occasion will not convey as true a story, as a case history running over a number of years. In this connection, the extraordinary energy, patience and prevision of Dr. Dickinson have given to gynecologists the opportunity of studying the dynamics of a woman's sexual history, as opposed to the more static pictures with accompanying emotionally colored, faulty memories. The exposition is frankly individual and though it reflects Dr. Dickinson's lack of formal training in psychoanalysis, it reveals an instinctive grasp of its more important teachings. One may see a serial change in his attitude from the beginning to the end of his practice, a logical evolution in his breadth of view. There is no sclerosis or inspissation; to the end he is young and elastic. We must remember in evaluating this book, that it was not planned in the present form when the histories were taken. It is not a short-term investigation, but a utilization of records at hand. Thus it may seem to contain some irrelevancies. These, however, all have human interest, throw side-lights on the events, show the catholic interest of the compiler and make the data very much alive. It should be noted that there is no attempt to outline treatment although there is ample internal evidence that efficient practical therapy is not lacking in many cases. The introduction states distinctly that the volume on therapy is to follow.

Both authors are selfcritical and so almost entirely disarm any possible criticism: "One case of itself proves nothing. Each single group proves nothing in itself; the material is better understood collectively." There is a wide variety. The case histories show that even in a thousand cases we have an opportunity for an excellent cross-section of all possible variations. Dr. Dickinson's experience has included some at least of any type of case that one may expect to find.

It is important to read the foreword, introduction and entire text. The tendency in the book toward tabulation, classification and "set-up," makes for good pedagogy but has the possible danger in that it prompts perusing, skipping and jumping ahead to points of major interest, with all of the consequent possible misjudgments. One single sentence modestly placed at the end of a paragraph, may be quoted as indicative of the authors' adherence to certain psychologic truths long before they had filtered through to the profession in general. "There

[1] **A Thousand Marriages. Medical Study of Sex Adjustment.** By Robert L. Dickinson & Lura Beam. The Williams & Wilkins Co., Baltimore, 1931.

was no incision for vaginismus.'' May I quote, also, an illuminating bit from the text: ''The patient could not get married because she had to support her mother and she could not sleep because she was worrying about the break with her fiancé. Her body's reaction to these burdens seemed to be the painful menstruation for which she wanted relief.'' This alone, will align Dr. Dickinson with the viewpoint of Walthard, and indicate his very early acceptance of teachings that are modern (and evidently not so modern).

In their discussion of frigidity, the authors give an excellent description in lay terms of the concept of ''distribution of libido.'' The following pertinent quotation demonstrates this beautifully:

''The diagnosis depends first on their knowledge and conception of the typical. Next it depends upon prolonged acquaintance with many other factors. Does the woman begin to be cold at general caresses at desire for coitus, at the excitement of preliminary caresses at intromission, at orgasm, after orgasm? If she accepts four stages but not five is that female frigidity? If there is complete sexual failure with the husband it is necessary also to know reaction to other men; if there is no responsiveness to men, it must be ascertained if there is no responsiveness to women; if there is anaesthesia to others of both sexes, it must be established whether there are erotic practices with the self; if there is no ascertainable sexual life as such, into what channel has the sexual impulse flowed? These facts must be known, not merely at one or another given time, but over the entire sexual period of the life. To indicate a completely frigid woman, every point must be invariably negative.''

In the deductions and interpretations one sees that many of the accepted ideas of the psychoanalytic school are used and paraphrased, particularly in respect to the super-ego. There is a consistent attitude to a woman as a biological unit. The ''unconscious'' is tacitly assumed by Miss Beam to play an important, if not predominant rôle.

In discussing the difference between the frigid wife and the wife with dyspareunia, the authors rightly stress the interchange of values of physical symptoms and mental reverberation. It is highly suggestive that a considerably larger percentage of brides who received premarital instruction from Dr. Dickinson had orgasm. It should, however, be remembered that their very coming for premarital instruction connoted a certain absence of the factor of refusing to face reality. The cases of dyspareunia are well summarized, the general conclusions being considerably more valuable than the attempt to utilize the relatively small number of cases statistically. Among the statistical facts of great interest, is the number of cured dyspareunia cases that remain frigid.

In the chapter on substitution and compensation, we are given a good description of sublimation, regressions, substitute formations, reaction formations as types of defense against pain in its broadest sense. These are lumped together as the ''third direction.'' The text reads very simply to the initiate, yet, I think, will offer some difficulty of digestion to ''lay'' physicians on account of the very necessary abbreviation. I regret that the important statement, that true sublimation is an unconscious process, was omitted. This fact limits considerably the rôle of the physician as deus ex machina.

Any conclusions drawn from the percentages of neurotic, neurasthenic, psychotic, etc., patients must take into account that Dr. Dickinson's definitions of these categories are quite at variance with our present classification. For instance, he calls hysteria a psychosis and uses the word neurotic in a different sense from the present-day psychiatrist. This is less of a criticism than a warning to a captious reader. One gets the feeling that the case handling is not profound and radical in the neuropsychiatric sense. Of course, the effect of early traumatic experiences and

childhood memories is repeatedly mentioned. Yet there is apparently no effort to correlate the dynamics of these as it is done, for instance, in a searching psychoanalysis. It is not practicable, nor even advisable to analyze so many people and it is to be remembered that the later patterns of behavior reflect by "repetition compulsion" the earlier ones. We are dealing then, with an "as if" concept, and the level at which the problem is approached may not matter. I hardly think that there has been sufficient emphasis on the incidence of early neuroses (in the modern sense) with which husband or wife or both come into marriage, and have the feeling also that this factor is of far greater quantitative importance than one would gather from a study of these cases. Acceptance of this point should throw considerable light on the instances of apparently well equipped couples, in which the marriage results in unhappiness. A person takes himself or herself along wherever he or she goes, even if it is into marriage. I suppose the book assumes on the part of the reader a considerable knowledge of transference phenomena. I hardly know whether such an assumption is valid. A careful perusal of the cases, the discussion and the therapy where it is given in the text, will convince the discerning reader that the particular personality of the gynecologist played a large rôle in case selection, in the communicativeness of the patients and in the efficacy of his suggestions.

I agree with Miss Beam that the balance between mental and physical manifestations of fear is unpredictable. A statement, however, that physical pain tends to vary inversely as mental suffering in the cases of dyspareunia, is slightly misleading, for this would depend to some extent, upon the form of neurosis present. On page 345, last paragraph, Miss Beam touches on the concept of the polarity of fear (fear and wish), the ambivalent attitude toward coition, creation and annihilation, in a fashion quite consistent with the most modern psychoanalytical approach. I doubt, however, whether this paragraph and its connotations can be fully grasped by people untrained along these lines. The apparent omission, that some cases were not referred to a psychoanalyst for radical investigation can be accounted for in part, by the dates of the observations. I have the feeling that at the present time, at least a few of the cases cited would be considered fit subjects for formal analysis.

It is pleasant to note the absence of condemnation of individuals, the insistence on a realistic point of view. This does not mean that there is not ample evidence in both authors of idealism. The ideal of beauty in the case of Dr. Dickinson is often translated into terms of line and mass, and in the case of Miss Beam into a lovely parallelism with musical form and architectonics. The fluency, forcefulness, clarity and great delicacy of her text is an outstanding feature.

Really reliable facts in regard to the average sex lives of married couples are so rare that this forms a notable addition. That they are from a somewhat selected group does not militate against their value, for it is quite reasonable to assume that the results are not far removed from the general, except in minor and ascertainable details. The book will repay the closest scrutiny—more than that; only the closest scrutiny, open-minded, patient and discerning, will afford a true estimate of its great worth.

This book should be read by every gynecologist, though not every gynecologist will understand it to its full, or be able to utilize its lessons. The approach used by Dr. Dickinson requires intuition, factual knowledge and experience, as well as a certain knowledge of one's self as a human being. One cannot expect to find these multiple requirements universally distributed. Nevertheless, it should be read as an antidote to shopworn teachings and shopworn attitudes toward gynecologic patients. The book takes its place in this respect, with a forward trend of the times.

The book will prove useful as a source book, full of illustrative and instructive cases, as a stimulus for gynecologists in demonstrating what can be done by thorough work and patient listening and how much there is in the material that they meet with daily, which has not been utilized. It is in addition, a condensation of most of the available knowledge to be found in such books as Reich's "Funktion des Orgasmus," Walthard, Halban, Liepmann, etc. It has, as well, a considerable methodological interest. It can be heartily recommended for its honesty, intense sincerity, scientific adherence to objectivity in spite of well-defined original hypotheses.

—*Max D. Mayer.*

GYNECOLOGY

Gynecological Surgery,[2] appearing in French, covers the entire field in a most thorough fashion, emphasizing French methods but doing full justice to the schools of all nations. The introductory chapters deal with general symptomatology and include such diverse subjects as study of the blood and urine, acid-base equilibrium, basal metabolism, menstruation, "ananeose" by which he signifies rejuvenescence (including ovarian grafts), as well as technical diagnostic procedures and salpingography. These chapters cover 100 pages. The next 40 pages are devoted to surgical technic. The remaining 600 pages of this large volume contain a detailed description of gynecologic operations. Vulvectomy is fully described, including the removal of the gland bearing areas. A large amount of space is devoted to birth injuries and repair of the pelvic floor, with an excellent chapter on the statics underlying this condition. The author, in my opinion, correctly places considerable emphasis on constitutional factors. He advocates the suture of the exposed levatores ani. In the construction of artificial vagina he describes the Baldwin, Graves, Schubert, and Heppner-Pozzi technics. A large number of operative procedures for the cure of vesicovaginal fistula are given, frequently, however, associating names with them that ignore the actual devisor of the methods. The operations for uterine displacements are numerous including technics not found in most textbooks. In extended hysterectomy for carcinoma, he habitually ligates the hypogastric vessels. Every gynecologic operation on the uterus, ovaries and tubes will be found fully described.

It is impossible in a brief review to even indicate the encyclopedic contents of this excellent gynecologic surgery. The value of the book is greatly enhanced by the large number of illustrations (966 figures), some original, many of them from the original sources to whom due credit has been given. The majority of illustrations have been excellently redrawn in line, which adds further to their graphic value. The text on the whole is clearcut and concise. Each chapter contains an extensive bibliography. Perhaps in the next edition the author, whose experience seems to be large, will be less impersonal and mention his own preferences and reasons for choosing the individual operations from the many at the disposal of the operator.

—*R. T. Frank.*

Appareil Génital de la Femme[3] is the second monograph to appear in the series of "Diagnosis, Anatomical and Clinical" of Paul Lecène, published in memory by his pupils and largely based on the notes left by this famous physician. Moulonguet and Dobkevitch have covered the entire field of gynecology in an interesting and informative fashion. Taking up individual lesions, some summarily, others in de-

[2]**Gynecologie Chirurgicale.** Par C. Sobre-Casas. G. Doin & Cie, Paris, 1931.

[3]**Les Diagnostics Anatomo-Cliniques de P. Lecene. Appareil Genital de la Femme (Premiere Partie).** Par P. Moulonguet et S. Dobkevitch. Masson et Cie, Éditeurs, Paris.

tail, the amount of space devoted to the lesions has frequently been guided more by their predilections than by the importance of the condition. They have been influenced it would seem, more by the teachings of their master than their own opinions in certain fields. For example, Lecène did not believe in immediate repair of torn perineums even if the tear was complete. The operations recommended secondarily after the mucous lining had spontaneously undergone repair, were simple but effective; anterior and posterior plastics; in older women the Lefort operation, and rarely hysterectomy.

Among inflammatory lesions, the rare condition of tuberculosis of the bartholinian gland is described most minutely. Elephantiasis and esthiomène are considered identical lesions. Kraurosis, leucoplakia, Bowen's and Paget's disease are considered under dystrophies. A number of cases of carcinoma of the vagina after complete hysterectomy are mentioned.

The difficulty in diagnosing ectopic gestation is stressed as it should be by every gynecologist. No mention of the biologic tests are made. Accidents resulting from pregnancy, such as uterine tears, retention of placenta, etc., are fully described. A detailed description of gonorrheal infections is likewise offered. Sharp distinction is drawn between the hot and cold stages of salpingitis. An operation for anteposition of the adnexa, with which I am not familiar, is described. The adnexa are placed in front of the broad ligament through a small incision made in this diaphragm. The illustrations in this book are excellent and worth careful study. The entire book is pleasant and informative reading to the advanced student, the clinical gynecologist and the gynecologic pathologist.

—*R. T. Frank.*

OBSTETRICS

In this well-illustrated volume of 208 pages Putschar[4] presents a most thorough study of changes produced in symphysis and sacroiliac joints chiefly under the influence of pregnancy and labor. The entire problem, so full of practical features, has aroused the interest of investigators only recently. The author's material consisted of fetuses of all ages, newborn and grown individuals of both sexes and all ages, making available for careful examination 198 symphyses and 78 sacroiliac joints.

The author differentiates eight different types of symphyses. He ascertained interesting sex differences in regard to the retropubic eminences which are seen in women as early as the twenty-third year but in men never before the thirty-sixth. About two-thirds of all individuals have this retropubic eminence, but it is more common in women and in them is dependent upon the number of pregnancies.

In connection with pregnancy and birth a hyperemia and hypertrophy of the ligaments occurs in the symphysis. Unless the child is very small, tears and hemorrhages in the ligaments about the symphysis seem inevitable with birth.

Changes of the type of arthritis deformans are seen in most adult pelves and especially in sacroiliac joints even before completed growth. This is presumably the result of the upright position resulting in strain and, at times, trauma. In three sacroiliac joints studied immediately after labor no cartilage regrowth was found, but all the ligaments were hyperemic, as were the capsules, periosteum and bone marrow. Regularly following birth one finds marked hyperemia and hemorrhages, spreading of the joint space and stretching of the anterior ligaments. In cases of twins and two primigravidae the cartilage was torn and also the capsules in many cases.

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[4]**Beckenverbindungen des Menschen mit besonderer Berucksichtigung von Schwangerschaft, Geburt und ihren Folgen.** Dr. Walter Putschar in Goettingen. Gustav Fischer in Jena, 1931.

This might be accepted as proof that the sacroiliac as a true joint has more play room than the symphysis. The author does not believe that childbirth in itself causes arthritic changes in the sacroiliac. Osteoarthritic processes are seen more frequently in parous women, but at the age of approximately fifty both sexes are about equally represented.

After labor all pelvic ligaments are relaxed. Tears of the symphyseal and stretching of the anterior ligaments of the sacroiliac joints are noted, so that there remains no doubt that during labor the pelvic outlet actually enlarges.

This volume contains much of interest both to the orthopedic surgeon as well as to the obstetrician.

—*Fred A. Jostes.*

The first edition of this book[5] appeared in 1917. Williams has also published a very interesting book on the diseases of the genital organs of domestic animals. It is surprising how much of interest the gynecologist and obstetrician will find in the pages of these veterinary obstetrics and gynecologies. The point of view is fully expressed in the preface in which the author says "the treatise is based upon the belief that the pathological phenomena of veterinary obstetrics are as natural as those of physiological birth, are authentically predictable, and subject, in an important degree, to control." This is of course due to the fact that the data of the heredity of large numbers of animals is at the disposal of the investigator and that breeding is completely under his control.

Some of the observations of most value to the obstetrician and gynecologist are worth quoting. In the mare, ovulation begins at 10 to 12 months of age but the offsprings of such breedings are poor and the labor is dangerous. Psychopathologic sex desire has been observed in both sexes, particularly in cattle. In cows, cystic ovaries commonly produce nymphomania. Sex desire frequently remains, although to a diminished degree, in stallions and bulls castrated in adult life. The sexual wandering of domestic animals is a regular phenomenon and is the cause of the spread of infectious diseases. The conception rate following copulation runs approximately parallel to the regularity of the estrual cycle. A cow failing to conceive, commonly "menstruates" within twenty-four to thirty-six hours after the end of estrus. This "menstruation" however, cannot be compared with the menstruation of anthropoids. No primary extrauterine pregnancy has been observed in animals. Abdominal pregnancy, when found, can always be traced to rupture of the uterus or the vagina. With sexual health, the number of young increases and the parity of the sexes is well balanced, while abortion and dystocia decline. Most domestic animals eat the placenta, with the exception of the mare. Extensive studies have shown that the sire is not the cause of dystocia.

This volume covers all phases of animal obstetrics, including obstetric physiology and pathology. Of particular interest are the many causes of dystocia among which may be mentioned persistent median wall of the müllerian ducts in the vagina, persistent hymen, and rigor mortis of the fetus. The subject of parturient eclampsia should be of interest to all. The entire volume can be recommended to obstetricians and gynecologists who are interested in comparative studies.

—*R. T. Frank.*

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[5] **Veterinary Obstetrics.** By W. L. Williams. Ed. 2. Published by the Author, Ithaca, 1931.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Selected Abstracts

Kidney Disease in Pregnant Women

Kamniker: Kidney Function in Pregnancy and the Puerperium. Ztschr. f. Geburtsh. u. Gynäk. **94:** 622, 1929.

Kamniker tested the kidney function in normal healthy pregnant women and found a retardation on one side in 50 per cent of the cases. When he tested the function in pregnant women complaining of ureteral pains, then the percentage was over 60 per cent, and in pyelitis, it rose to over 90 per cent. This retardation in function is not due to a decrease in secretion by the kidney, but is due to a stasis in the ureter, which is dilated. This stasis also has an effect on the peristalsis, which shows marked irregularities, and likewise on the renal function on the affected side, as the urine is concentrated more slowly. On x-ray examination ureteral dilatation may be demonstrated when the excretion of the dye is retarded. The dilatation and retardation of secretion disappear after delivery. The writer could not demonstrate this stasis before the fourth month of pregnancy nor after one week postpartum; it most frequently occurred between the sixth and eight month of pregnancy.

In these months of pregnancy, the clinical picture of pain in the flank, usually the right, associated with normal urine, the ureter sensitive to pressure, and retardation of the secretion of the dye, indicates dilatation and kinking of the ureter.

Lester E. Frankenthal, Jr.

Brakemann, Otto: Changes in the Urinary Tract in Pyelitis of Pregnancy. Zentralbl. f. Gynäk. **54:** 278, 1930.

The author believes the changes occurring in the ureter during pregnancy are in the middle third of the tract because of the anatomic relations of the ureter. In this third there are few supporting structures, and therefore it is not surprising that kinks and lateral displacements occur. In the nonpregnant individual, dilatation of the ureter must be considered as due to toxic paralyses of the smooth muscles of the ureter, but in the pregnant woman there is the added cause of pressure of the growing uterus on the ureter. Pressure and toxic paralysis, working together, cause a marked dilatation of the upper part of the ureter in pyelitis of pregnancy.

William F. Mengert.

Guthmann and Ehrhardt: The Physiologic Limits of Ureteral Dilatation in Pregnancy. Zentralbl. f. Gynäk. **55:** 341, 1931.

The authors believe that a dilatation of the ureter from one finger to two thumbs in thickness as observed on an x-ray plate, should be considered as still physiologic during pregnancy. Dilatation may occur to a marked degree without any resulting

pain, and if the urinary findings are negative, the condition must be accepted as the physiologic accompaniment of pregnancy. Such a dilatation may be considered pathologic only when there are abnormal urinary and kidney findings associated with pain, provided the pain disappears temporarily following mechanical or pharmacologic emptying of the ureter.

WILLIAM F. MENGERT.

Schumacher: X-ray Studies of the Changes in Renal Pelvis and Ureter Due to Pregnancy. Arch. f. Gynäk. **143:** 28, 1930.

Schumacher studied the changes produced in the renal pelvis and ureter by pregnancy by means of intravenous pyelography. He states that all of the methods previously used were not physiologic and resulted therefore in erroneous conclusions. Intravenous pyelography produces no pathologic or abnormal changes and the results of these studies are therefore accurate and precise. One hundred women were studied at various intervals throughout pregnancy. No changes were found in the normal course of the ureters, during the first five months of pregnancy. However, the abdominal portions of the ureters appeared hypotonic and dilated in many instances even early in pregnancy. From the fifth to sixth month, 50 per cent of the ureters and 80 per cent after the seventh month were pushed laterally and posteriorly throughout their abdominal course. After the fifth month, ureteral dilatation is present in 100 per cent and is bilateral in 83 per cent. In 15 per cent only the right ureter was involved and in 2 per cent only the left one showed dilatation. This dilatation amounts to at least 2 cm. and is present in multiparae as well as in primiparae. By contrast, the pelvic portions of the ureters were found to be dilated in only 2 per cent. The remaining 98 per cent showed normal tonus and peristalsis in this area. The dilatation is due to pressure of the pregnant uterus which pushes the ureter against the belly of the psoas muscle. The right ureter is more frequently dilated and to a greater degree as result of greater pressure due to uterine torsion to the right. Type of pelvis, and fetal position and presentation have no effect upon the amount of pressure exerted. The asthenic type shows more compression than does the normal type.

RALPH A. REIS.

Albeck, V.: Sixty-nine Cases of Febrile Pyuria Gravidarum. Acta Obst. et Gynec. Scandinav. **9:** 30, 1930.

Among 10,000 parturient women the author found 226 cases of pyuria. Of these, 69 patients had fever during pregnancy or labor. Only 15 patients had premature labor and in 6 instances, toxemia of pregnancy was most likely the cause. In 6 cases, pregnancy was interrupted therapeutically, hence in about one-third of the cases pregnancy did not go to term. The fetal mortality was 11.6 per cent. Only one mother died but one had a nephrectomy before she left the hospital. All the patients still had a bacteriuria at the time they left the hospital in spite of intensive medical treatment.

J. P. GREENHILL.

Popoff and Spanswick: Pyelonephritis of Pregnancy due to Eberthella Alkalescens. J. Lab. & Clin. Med. **16:** 437, 1931.

A primigravida, aged twenty-three years, three months pregnant was admitted to the hospital with a diagnosis of pyelitis complicated by vomiting of pregnancy. Cystographic examination revealed a generalized cystitis with both ureters in normal position and with no dilatation or angulation. The urine obtained directly from both

kidneys by ureteral catheterization was full of pus. Functional phthalein test after fifteen minutes gave 25 per cent on the left side and 0 on the right side. X-ray pyelograms were normal. Urine cultures showed large numbers of gram negative nonmotile bacilli resembling B. dysenteriae. The same organism was recovered from the stool. Blood culture was negative. In view of the progressive toxemia, a therapeutic abortion was done, eighteen days after admission. The patient made a prompt recovery.

Appropriate cultural and agglutination tests on the organisms identified them as Eberthella alkalescens. Such cases of dysenteric pyelonephritis are very rare. Similar cases previously described agree with the identification of this organism. Since both the urine and feces contained the same organism the authors assume that the infection in the kidney was lymphogenous in origin from the large bowel.

W. B. SERBIN.

Levy-Solal, Dalsace, Misrachi and Solomon: A New Procedure for the Radiologic Exploration of the Pregnant Woman. Bull. de la Soc. d'obst. et de Gynéc. 4: 228, 1930.

The authors employed the technic of Lichtenberg and Swick for obtaining pyelograms after the intravenous administration of uroselectan. In normal cases about 90 per cent of the drug is eliminated within eight hours, hence this method not only permits visualization of the urinary tract but also offers a means of determining renal function. It eliminates the trauma associated with the passage of ureteral catheters and also enables one to examine both ureters at the same time. The authors show two radiographs taken of pregnant women and these are most likely the first ones taken after the employment of this special technic. No harmful results were observed.

J. P. GREENHILL.

Davidson and Turner: Bilaterial Cortical Necrosis of the Kidneys. A Clinical and Pathological Report of Four Cases. Edinburgh M. J. 37: 101, 1930.

Bilateral cortical necrosis of the kidneys is very rare and comparatively symptomless. It appears that in the early stages at least the only prominent feature of the disease is suppression of the urinary secretion, which may be partial or complete. All four cases here reported presented the same characteristics: progressively increasing drowsiness, air hunger and diminished secretion of urine.

The pathologic changes found in the four cases were typical for bilateral cortical necrosis of the kidneys. In only one case was there any distinctive change found in the liver. Otherwise there was nothing suggestive of the liver typical for eclampsia.

All the cases showed a well-marked thrombosis of the interlobular arteries and afferent vessels of the glomeruli. There was no evidence of any marked vascular degeneration such as arteriosclerosis, nor was there any change indicative of chronic interstitial nephritis. Edema of the interstitium was present, but was probably just an accompanying change or a result of the necrosis.

Some evidence of generalized infection was found in three of the cases examined. Of course this is not always conclusive. Infection may be a terminal or concomitant condition.

All treatment for such cases either conservative or operative seems to be futile.

WM. C. HENSKE.

THE AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

At the meeting of the Board held in Chicago December 29, 1931, forty (40) applicants for certification were examined. Of this number twenty-nine (29) applicants were approved, eight (8) were conditioned and three (3) failed.

The next written examination of the Board will be held in nineteen (19) different cities of the United States and Canada at 2 P.M. on Saturday, March 26, 1932. The general, oral and clinical, examination will be held in New Orleans on Tuesday, May 10, 1932, immediately preceding the meeting of the American Medical Association. Reduced railroad fares will be available. For detailed information and application blanks apply to the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh, Pennsylvania.

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